ELECTRICAL WEST

February 1950
25 cents

31st Annual Review and Forecast

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

and / or!

Isn't it amazing how the aptness of old proverbs is proved time and time again? The sages who first uttered them were really pretty wise men.

Take that one about "It takes two to make a bargain." It certainly states the case for electric ranges and water heaters. Those two really make a bargain — double the ease, convenience, comfort and pleasure, plus a special low electric rate for cooking and water heating.

The current series of Edison advertisements which emphasizes this to customers is widening the sales horizon for every appliance dealer in Edison territory. The advertisements don't say "buy both" but simply "*have* both." So in addition to prospects who have neither an electric range or water heater, they appeal to those who have one but not the other.

One sale is fine, but two are even better. So as the radio quizmasters say: "Wouldn't you like to try for two?"

Edison Southern California Edison Company

This is General Electric's new secondary capacitor—3-kvar, 240-volts, single-phase—for pole mounting. It is approximately 40 per cent lower in price per kvar than similarly rated secondary capacitors heretofore available.

NOW! low-cost secondary capacitor

opens new fields in kvar generation

Secondary capacitors give the same benefits as primary capacitors for all the system, back to the generators, and in addition they decrease the voltage drop in the transformers and the secondary runs. Secondary capacitors will allow you to have more customers on each feeder, or existing customers can increase their load by 20 to 50 per cent for the same allowable voltage limits between the first and last customer with existing transformers.

Look into this new secondary capacitor for those load areas where either voltage drop or distribution transformer capacity is a problem. In many cases, it has proved most economical. We'd like to go over our calculations with you. Apparatus Dept., General Electric Co., Schenectady 5, N. Y. *Get in touch with your G-E representative, or write direct to Capacitor Sales Divisions, General Electric Co., Pittsfield, Mass.*

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

FEBRUARY 1950

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright, Sixty-second year of publication

ELECTRICAL WEST

James H. McGraw (1860-1948), Founder
James H. McGraw, Jr., Chairman of the Board — George C. Tenney, President and Editor
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Figures to show the way market is going: what and where opportunities are: what help can be expected from the utilities.

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Cover photo: Raising height of Long Lake Dam, Washington Water Power Co.

Next Month

Look for an article on construction features of a rural distribution line built in a mountain area where the Forest Service would permit only an absolute minimum of right-of-way clearing. Among other engineering features there will be an article dealing with drivers' tests for utility automotive equipment. The Los Angeles Department of Water and Power has in operation a program designed to reduce the accident rate of its drivers.

The heat pump will again come in for discussion. This time we will have an article by a contractor in Portland relating his experience with heat pumps in that area. Then there will be another article in the preventive maintenance series.

In the lighting and wiring section there will be an article on an interesting industrial heating application, and one on a $78,000 department store wiring modernization job. Also in this section there will be an article showing the results of an electrical contractor getting out and really doing a selling job.

There will be in addition another of the Northwest Data sheets and the two News Letters—the one for retailers and the new and meaty News Letter for the electrical contractor.

Besides, there will be the regular features — Electra's Husband, news, association reports, news of people, new products, trade notes, books, etc.

ADVERTISING REPRESENTATIVES

Chicago (11) ..... Philip S. Griffin, 520 N. Michigan Ave.
Cleveland (15) ..... Frank J. Sailer, 1510 Hanna Bldg.
Los Angeles (14) ..... W. D. Lanier, 621 S. Hope St., MI. 3691
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San Francisco (4) ..... Tom Carmody, 68 Post St., DO. 2-4600

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L-M "Round-Wounds"

just don't leak!

. . . we've been using this "upside down" test to check transformer cover sealing since 1936

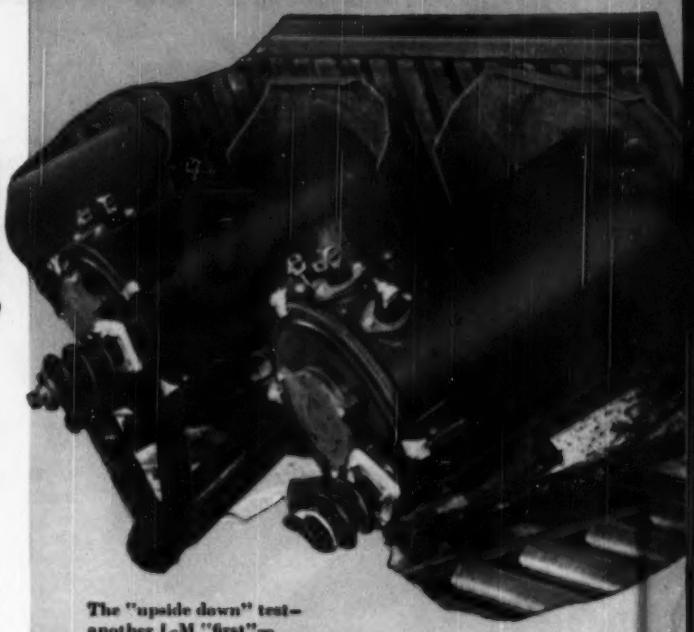
Recently there's been a good deal of interest in transformer tank sealing, with sealed tank construction incorporated in the Fourth Report of the EEI-NEMA Joint Committee on Transformer Standards.

But tank sealing is an old story to Line Material. Years ago new customers were surprised because we shipped our transformers with the oil *inside*—not in a separate drum as others did. But our customers soon learned that the oil didn't leak out of L-M transformers because of L-M's original oil-tight tank and bushing seals.

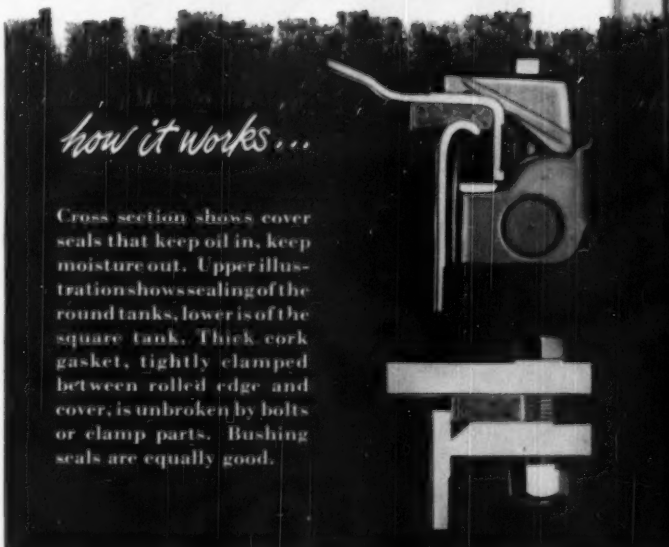
Today L-M is recognized as one of the largest manufacturers of distribution transformers. L-M is also known as a leader in the development of *sealed tank* distribution transformers.

But it's not only the fact that the tanks on L-M "Round-Wounds" are sealed that's important. It's also *what* is sealed into the tanks that counts. In the L-M Round-Wound Transformer is the famous wound core that isn't cut, unwound, or disturbed in any way after annealing. There are the long, round coils wound directly onto the core. The design provides "Balanced Performance" with its many desirable characteristics—high short time overload capacity, excellent regulation, many other features.

You get more with "Round-Wounds." Why not get more information about them? Ask the L-M Field Engineer for the story—or write—**Transformer Division, Line Material Company, Zanesville, Ohio.**



The "upside down" test—another L-M "first"—long ago!



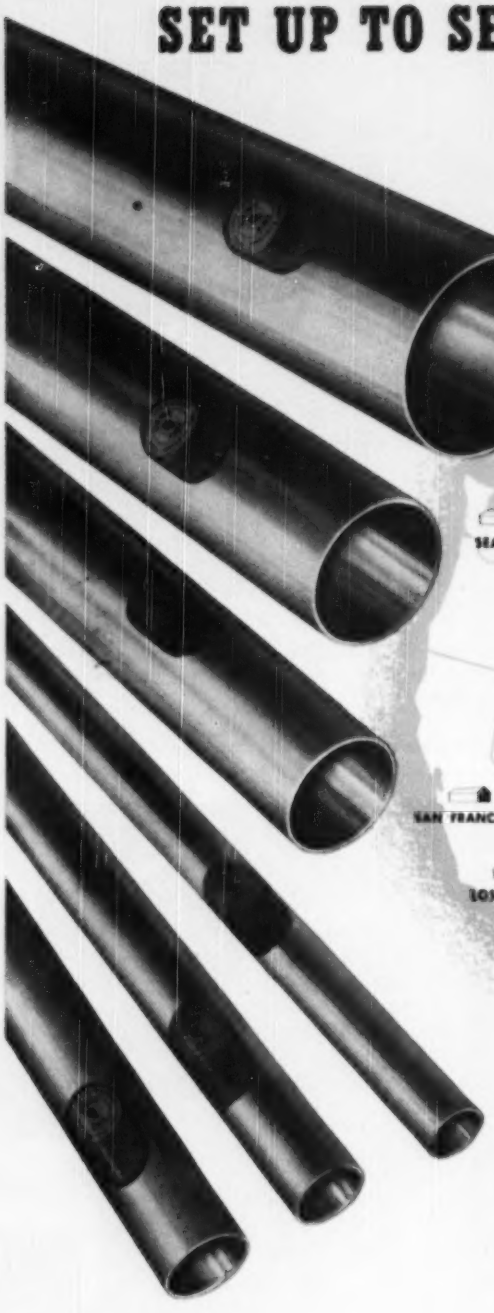
how it works . . .

Cross section shows cover seals that keep oil in, keep moisture out. Upper illustration shows sealing of the round tanks, lower is of the square tank. Thick cork gasket, tightly clamped between rolled edge and cover, is unbroken by bolts or clamp parts. Bushing seals are equally good.

LINE MATERIAL Transformers

Complete Coordinated Equipment for All Distribution Requirements

SET UP TO SERVE YOU QUICKER



7 STRATEGIC WAREHOUSING POINTS FOR ROME-EMT...

It Costs Less to Buy the Best...
Buy Rome-EMT

Approved by Underwriters' Laboratories, Inc.

ALL OVER THE WEST AND SOUTHWEST

WITH Rome • EMT

THE *BETTER* ELECTRIC METALLIC TUBING

When you specify ROME•EMT you are not only buying a high quality thin wall conduit, but are assured, as well, of a warehousing set up that provides prompt delivery. Supplementing wholesalers' stocks, there are seven strategically located Rome Cable warehouses carrying a full range of ROME•EMT sizes, backed by adequate and modern manufacturing facilities at Torrance, California.

It will pay you to standardize on ROME•EMT for several reasons. First, it is lighter, more economical and easier to handle than heavier types of raceway materials. Further, manufactured on the most modern equipment available, it is uniformly accurate in diameter and wall thickness. Electro-galvanized, ROME•EMT has a uniform outer protection against corrosion, while a clear, mirror-smooth inside enamel finish makes pulling easy. Finally, ROME•EMT has been recognized as establishing a *new standard of quality* in electrical metallic tubing.

ROME•EMT is available in ½", ¾", 1", 1¼", 1½" and 2". Get it from your electrical wholesaler, or call your nearest Rome Cable office today.

For unexcelled cable performance:

RoZone

RoMarine

RoPrene

RoLene

RoFlex

RoBarn

Rome Synthinol®

Remember these names for dependable quality.

Completely balanced stocks of ROME•EMT are maintained at all points for prompt shipment.

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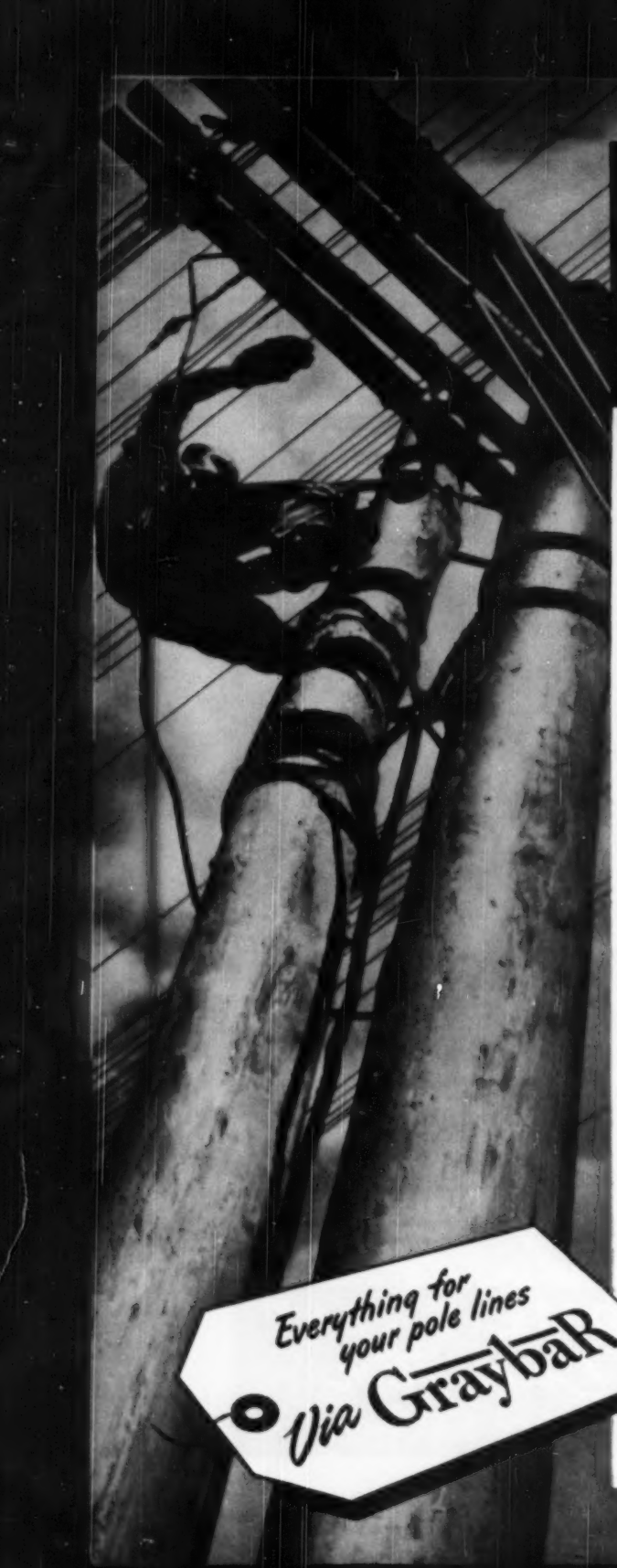


TIGHT JOINTS

AT ALL POINTS . . . "VIA GRAYBAR"

Reliable Connectors, Splices

Graybar can supply everything your linemen need for connecting all types of lines *securely*. Two of the high-quality Reliable items we distribute are: (1) Solderless connectors – accurately cold headed. All parts are at least 98% copper, have no sharp corners, and have torque, compression, and reuse factors far above ordinary connectors. (2) Automatic splices and deadends for copper, ACSR, or steel strand – now filled with non-corrosive grease and packed to stay in perfect condition.

O-B INSULATORS

In these days of overloaded distribution systems, no line is stronger than its insulators. Graybar supplies superior-quality Ohio Brass insulators in strain, pin, and suspension types.

ONE SOURCE FOR ALL

For both transmission and distribution lines, Graybar has everything "from the bottom of the hole to the top of the pole"! By ordering all your pole-line needs from this single source, you save time and paper-work expense. You get the leading lines of poles, crossarms, insulators, hardware, strand, line trucks and tools. And you get them the quickest way possible – delivered wherever you specify.

Men who know your needs

When you call on Graybar, for supplies or for information, you can expect us to meet your needs both promptly and accurately. That's because Graybar has been familiar with your needs ever since the first lines went up. You're welcome to the help of the near-by Graybar Outside Construction Specialist in planning any pole-line or underground project. *Graybar Electric Company, Inc. Executive offices: Graybar Building, New York 17, N. Y.* 5018

SERVING THE ELECTRICAL WEST

Wagner Distribution Transformers are Standardized in every rating and design

IN ACCORDANCE WITH E.E.I.—NEMA FOURTH REPORT

Wagner's complete line of distribution transformers includes every rating and design listed in the E.E.I.—NEMA Fourth Report—no matter what your particular requirements may be . . . there's a Wagner transformer to fit your needs.

You save time, money and worry when you make your selection from Wagner's widely diversified line of distribution transformers — you get the benefit of Wagner's quality construction, improved design, and high efficiency with *standardized* mechanical features in ratings of 500 kva and below — 15,000 volts and below.

Wagner has a nationwide organization to provide fast, convenient service, with 29 branch offices in principal cities ready to help you with your transformer problems. Bulletins TU-180 and TU-181 give complete information on Wagner Transformers.

Wagner Electric Corporation EST. 1891

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

Help for your conductor problems

Call a Kaiser Aluminum engineer.

He will study your problems and bring you sag and tension charts, staking and stringing sag tables, and a bookful of other data.

Kaiser Aluminum Conductor engineers have compiled them to answer your problems . . . tailor-made to help you complete your project efficiently and economically.

This engineering service—precise and individual—saves you money and makes certain that Kaiser Aluminum Conductor gives you the best on-the-job performance.

Just call a Kaiser Aluminum engineer on *your* conductor problems!

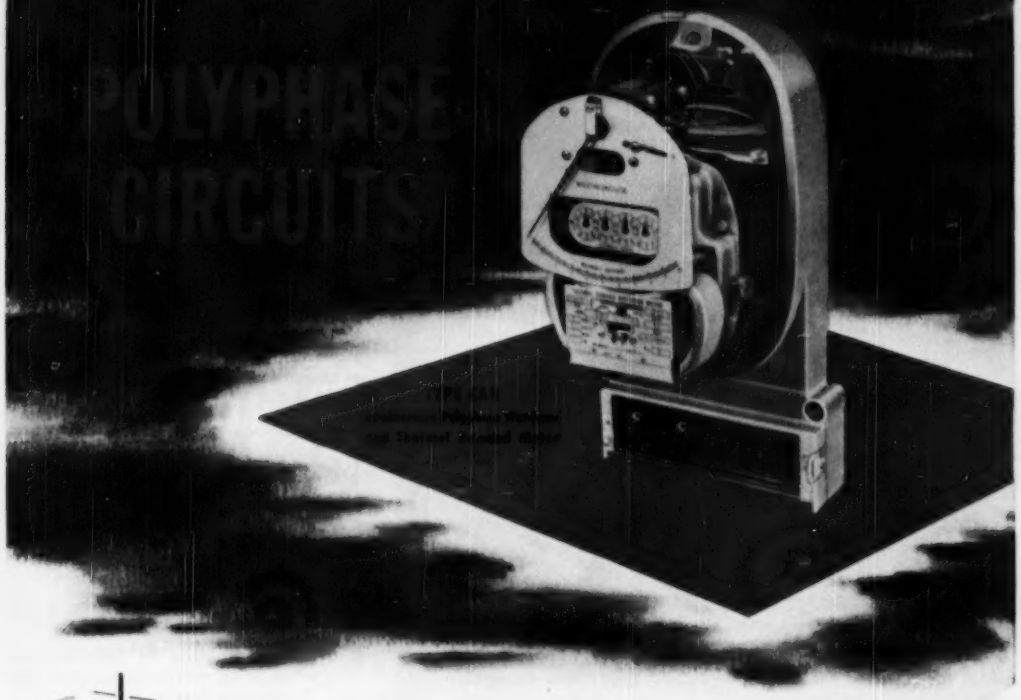
Kaiser Aluminum Conductor is produced by Kaiser Aluminum & Chemical Corporation.

Kaiser Aluminum

CONDUCTOR

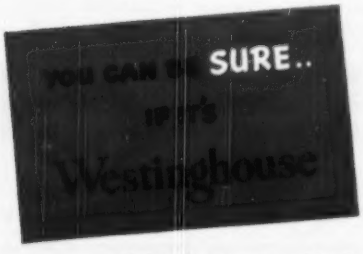
SOLD BY KAISER ALUMINUM & CHEMICAL SALES, INC., KAISER BUILDING, OAKLAND 12, CALIF. . . . . OFFICES IN: Atlanta • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Houston • Indianapolis • Kansas City • Los Angeles Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Portland, Ore. • Rochester, N. Y. • Seattle • Spokane • St. Louis Wichita • *Also available through General Electric Supply Corporation, Westinghouse Electric Supply Co., and Line Material Co.*

ECONOMICAL DEMAND METERING ON POLYPHASE CIRCUITS



...even where the load is small!

Here's your answer to the problem of low-cost demand metering on polyphase circuits . . . for the *full range* of loads.



New, low-cost Westinghouse polyphase Demand Meters combine a standard polyphase Watthour Meter and a Thermal Demand Meter into *one* compact unit. Their inherently low maintenance characteristics make possible the sound economy of demand metering on small *or* large loads. Only one mounting is required . . . taking up little more space than one three-element polyphase Watthour Meter. Installation is greatly simplified. A low first cost is made possible through simplified design.

Whatever your requirements may be . . . kw *or* kva demand meters . . . single-phase or polyphase . . . Westinghouse has the meter that will give you the *accurate* and *economical* information you need. For complete information call your nearest Westinghouse office or write for C. S. 42-338, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-40564

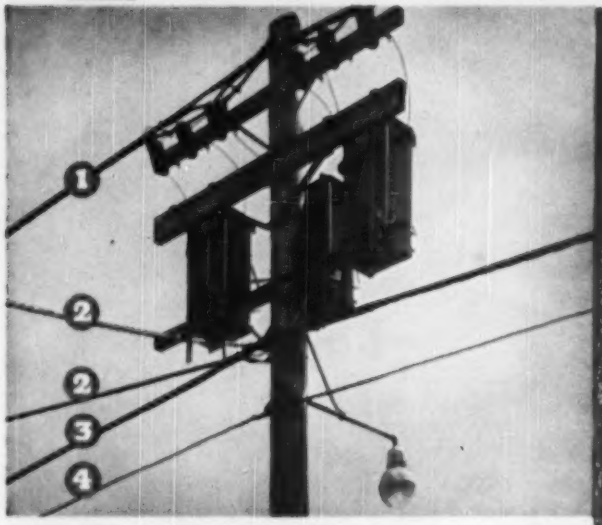
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Watthour and Demand Meters for Any Job

4 applications for OKOLITE-OKOPRENE *aerial cables*

. . . with these 16 advantages



1—PRIMARIES 2—SERVICES 3—SECONDARIES 4—LIGHTING CIRCUITS—all on one pole at Bonneville, Oregon.

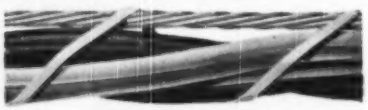
• Most utility engineers now recognize the advantages of aerial cables for primary circuits. Moreover, many are now using this economical cable design for street lighting circuits, for secondaries — including networks — as well as for service drops. For such installations, time-proved Okolite-Okoprene aerial cables — whether self-supporting, ring-supported or spinner-lashed — offer many advantages.

The patented Dualay* assembly, originally designed by Okonite engineers for hot-tapping of Okolite-Okoprene self-supporting primary cables, is also of distinct value for secondary circuits, since services can be taken off at any point, even in mid-span, without racks or spreaders.

In addition to their suitability for utility overhead systems, Okolite-Okoprene aerial cables are extensively used by industrial plants and railroads for power, lighting, communication and control systems. Details on the many types available, with complete data on selection and installation, are available in Bulletin WE-1033. The Okonite Company, Passaic, N. J.

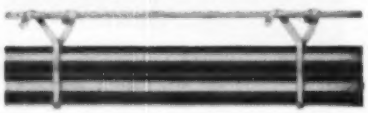
*In the Dualay method (U.S. Pat. 2,430,378) the insulated conductors are twisted together so that the direction of lay is reversed at regular short intervals to permit conductor separation without cutting the copper or performing any operation on the messenger.

- **Improved circuit regulation and lower voltage drop through lower reactance.**
- **Tree trimming reduced or eliminated.**
- **Overlength poles not needed to clear treetops.**
- **Fewer service interruptions or outages.**
- **Reasonable original cost.**
- **Lower maintenance cost.**
- **Simple to install.**
- **Higher safety factor for linemen, people and property.**
- **Good appearance.**
- **No festooning.**
- **Long spans.**
- **Less congestion on poles.**
- **Elimination of cross-arms.**
- **Reduced clearance space near buildings and other structures.**
- **Greater reliability in storms—resist wind, icing, moisture—operate even if poles are down.**
- **Messenger serves as neutral.**



Okolite-Okoprene *Self-Supporting* Aerial Cable with in-built messenger. Made with Dualay* design for easy tapping.

Okolite-Okoprene cables can be lashed to messenger by the *spinner method.*

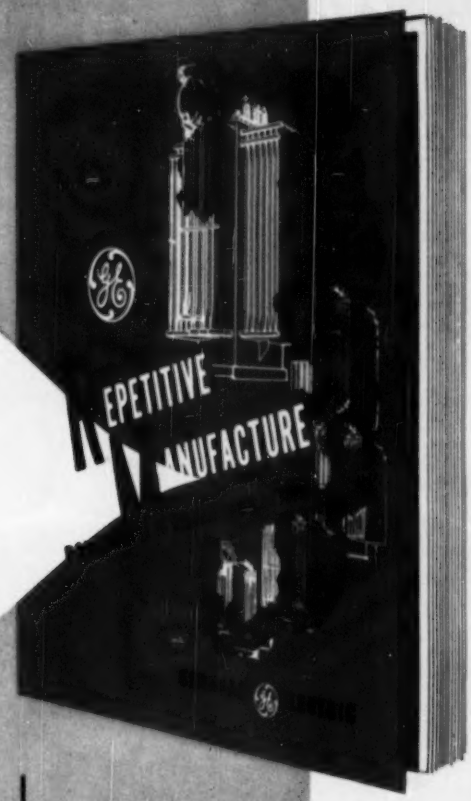


Okolite-Okoprene cables may be installed in regular *messenger rings.*

OKONITE SINCE 1878 *insulated wires and cables*

7490

HERE ARE ALL THE FACTS ON RM* POWER TRANSFORMERS



*Certain G-E power transformers, within the complete G-E line, have for a number of years been designated as "repetitive manufacture," or "RM" for short. These are standard transformers—that lend themselves to quantity production.

Through quantity production RM transformers can be built faster, at lower cost. Engineering and drafting for any particular transformer is already done—component parts can be mass-produced—jigs and fixtures are already on hand.

As a result, RM transformers can be delivered months sooner than non-RM transformers. Their prices are lower, by at least eight per cent, than specials of identical ratings.

"RM" transformers are available in ratings of 667 to 5000 kva, single-phase, and 750 to 10,000 kva, three-phase and with high voltages in accordance with EEI-NEMA preferred voltage ratings between 2400 and 67,000 volts. They are equipped with the most popular types of terminals and accessories.

A NEW 44 page catalog gives you

Prices • Ratings

Electrical and mechanical data

Application and selection data

Lists and descriptions of basic accessories and optional features

If you haven't received your copy of GEC-479, call your local G-E office or write *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Get CORRECT CONDUIT CONNECTIONS

The easy economical way

• NEATER • STRONGER • FASTER • APPROVED

Select the best, insist on Briegel All Steel Fittings, the original approved Indenter type connectors and couplings for thin wall conduit tubing. You will not only find that Briegel Indenter Fittings are easier and faster to use, but also make neater, stronger connections, the correct connections. Two Easy Squeezes and they're set. Start using Briegel Fittings today. Have more satisfied customers—more profits from each job.

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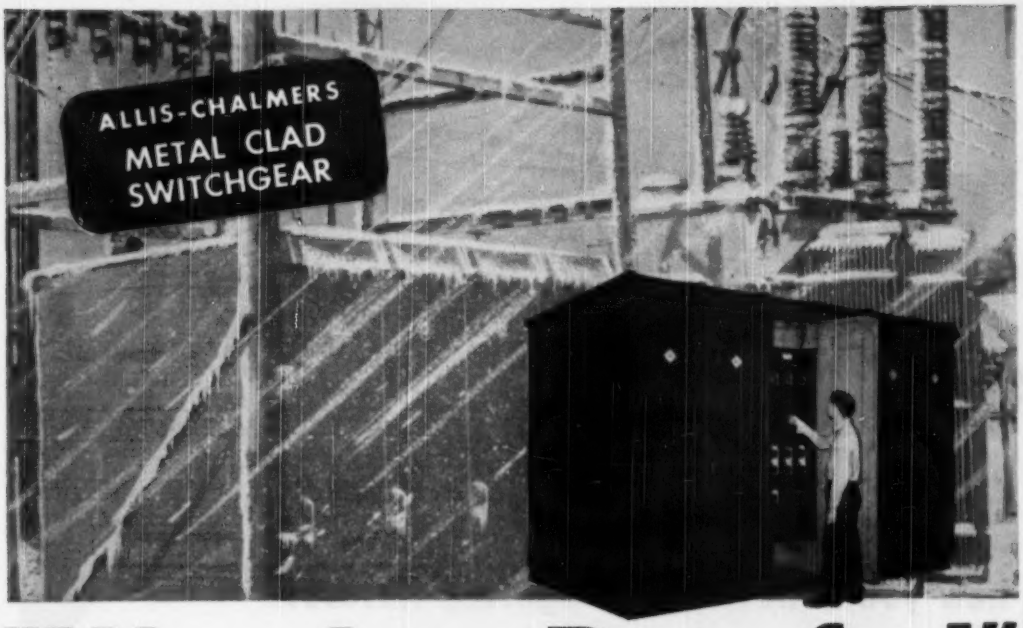
All B-M Fittings Carry the Underwriter's Seal of Approval and Canadian Standards Ass'n Approval No. 9296

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS



"Weather-Proofed"

AGAINST RAIN, SLEET, SUB-ZERO TEMPERATURES AND HIGH WINDS!

WEATHER-PROOFED Allis-Chalmers switchgear performs dependably in rain, sleet, sub-zero temperatures and high winds. Weather-proof construction provides protection in any weather . . . any atmosphere.

Here's why: (1) welded-in floor plates form tight bottom seal; (2) overhanging eaves keep out driving rain and sleet and protect vital switching equipment; (3) front and rear weather-proof door are held closed at three points; (4) rust resistant phosphate treated steel panels, multi-coated with weather tested paint, complete the top-to-bottom weather barrier; (5) ice and sleet shields protect locks.

Contact your local A-C sales representative for further information or write direct.

ALLIS-CHALMERS, 939A SO. 70 ST. A 2916
MILWAUKEE, WIS.

. . . PLUS OTHER ADVANTAGES

Protected Ventilation

Copper mesh filters behind louvre openings bar the entry of dust, dirt, insects, etc. They allow air to circulate and cool the switchgear interior. Space heaters prohibit moisture condensation, a frequent cause of insulation failure.

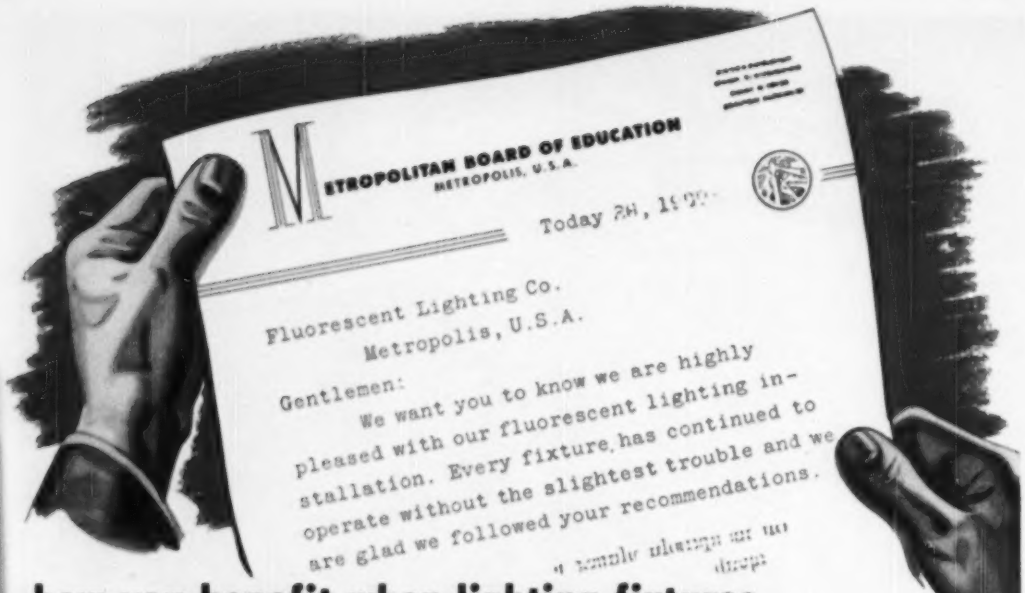
Full Length Instrument Panel

Provides more space for meters, relays, instruments. Panel swings out so you can readily reach secondary wiring. Provides protection, too. This design is adaptable to a variety of circuit arrangements.

Safer Than Ever Before

Bolted-on steel barriers completely isolate circuit breaker, current transformer, disconnect switch, lightning arresters, drawout potential and control transformer, and other equipment compartments.

ALLIS-CHALMERS


METROPOLITAN BOARD OF EDUCATION
METROPOLIS, U.S.A.
Today
Fluorescent Lighting Co.
Metropolis, U.S.A.
Gentlemen:
We want you to know we are highly
pleased with our fluorescent lighting in-
stallation. Every fixture has continued to
operate without the slightest trouble and we
are glad we followed your recommendations.

how you benefit when lighting fixtures are equipped with....

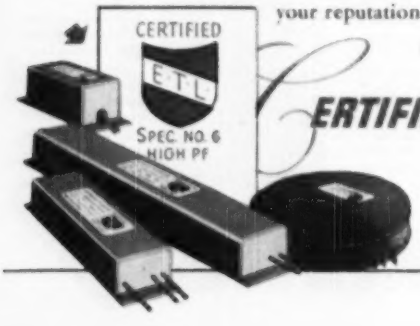
CERTIFIED BALLASTS

• Your reputation in the lighting field depends on just one thing . . . Customer Satisfaction!

That likely is a reason why more and more CERTIFIED BALLASTS are being used . . . for ballasts are a highly important factor in the performance of fluorescent lighting fixtures. And men who value their business reputation have learned to rely on the satisfactory performance of CERTIFIED BALLASTS.

CERTIFIED BALLASTS are made to exacting specifications that assure dependable, trouble-free operation of both the ballasts and the lamps. Electrical Testing Laboratories, Inc., tests, checks and then certifies them.

For fixture performance that assures customer satisfaction . . . and protects your reputation . . . ballasts that bear the "Certified" shield are your safest choice.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

SUNBEAM provides

modern lighting

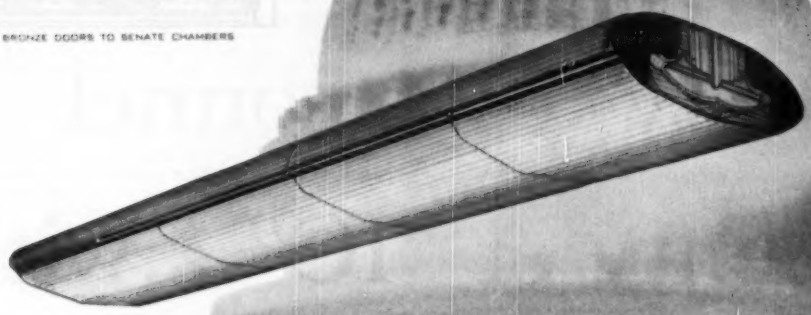
for a

modern government

in the

Senate and House Chambers of U. S. Congress, Washington, D. C.

BRONZE DOORS TO SENATE CHAMBERS



SUNBEAM is proud to have a part in the reconstruction and remodeling of the Senate and House chambers of the United States Capitol. Modern, scientific lighting for these august chambers is being achieved with SUNBEAM'S H8084 fixtures which were specified and are currently being installed. Rich in appearance and noted for controlled light distribution qualities, these units are ideal for this lighting installation. The H8000 series utilizes Holophane Controlenses® which direct the light with maximum advantage over the working plane. Full length piano-hinged bottoms allow for easy maintenance.

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James M. Gongwer . . . . . Consulting Engineers
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manufacturers of **BFK** lighting fixtures

Macy's

San Francisco
gets

extreme flexibility

to handle load changes and future load growth

low installation cost

everything was shipped complete—as a unit—and easily installed

safety to personnel

no exposed circuits; metal encloses all current-carrying parts

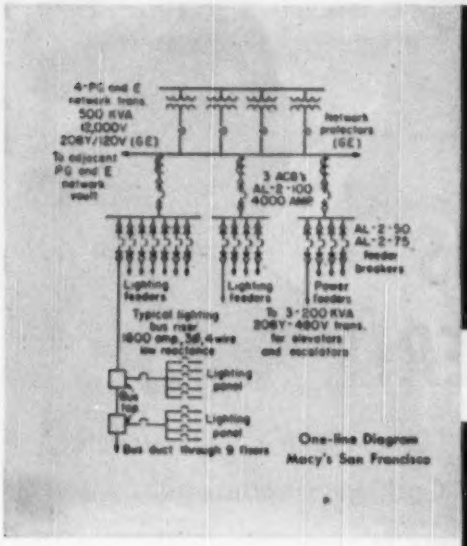
plenty of "IC"....with

10,000 amperes interrupting capacity, adequate to handle all short circuits

GENERAL ELECTRIC

HERE'S WHY . . . *"In the department store business we cannot take any chances with power outages or potential fire hazards. We must also plan for expansion. That's why we wanted our power distribution system to be safe, to have adequate feeder and branch-circuit capacity, plus flexibility. General Electric switchgear gave us all these requirements."*

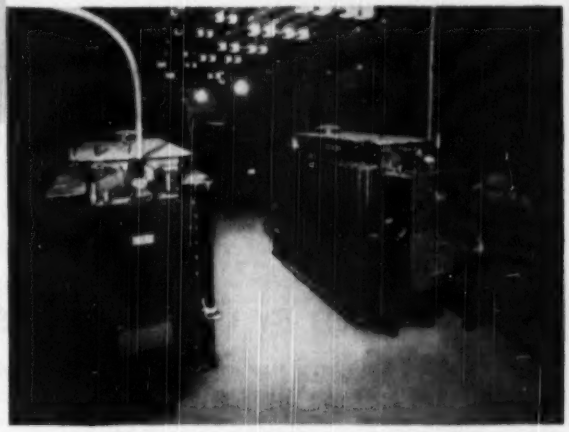
E. L. MOLLOY, VICE PRESIDENT
MACY'S, SAN FRANCISCO


4-PG and E network trans. 500 KVA 12,000V 208Y/120V (GE)
To adjacent PG and E network vault
Network protectors (GE)
3 ACB's AL-2-100 4000 AMP
AL-2-50
AL-2-75
feeder breakers
Lighting feeders
Lighting feeders
Power feeders
Typical lighting bus riser 1600 amp, 3ϕ, 4-wire low reactance
To 3-200 KVA 208Y-480V trans. for elevators and escalators
Lighting panel
Bus duct
Lighting panel
Bus duct through 9 floors
One-line Diagram Macy's San Francisco

This, the largest switchgear installation to date in any San Francisco commercial building, adequately handles the power requirements that average four watts per square foot (nearly 500,000 square feet). Flexibility of the feeder system permits load changes without increasing the load on the switchgear. The 4000-ampere breakers have induction relay tripping.

Macy's installation is a complete General Electric project—switchgear, three 200-kva transformers for elevators and escalators, power and lighting panels, motors, and control for ventilating and boiler-room auxiliaries. One source of responsibility plus the very best in co-ordinated planning, engineering, manufacturing, and service facilities to give maximum savings and efficiency to the customer.

G-E metal-enclosed switchgear handles the incoming 120/208-volt power. The equipment is divided into three sections, two for lighting, one for power. Breakers (cascaded) are of the drawout type for ease of inspection and maintenance.



Four G-E network units, rated 500 kva, 12,000-120/208 volts in a Pacific Gas and Electric Company vault serve the building. Macy's 2500-kva load represents one of the largest loads added to PG&E's downtown network in recent years.

low-voltage SWITCHGEAR

Modern industrial power distribution systems using G-E switchgear are applicable to any industrial plant or commercial building where you want proper voltage for top performance of equipment, an extremely flexible setup to take care of expanding or changing loads, adequate short circuit protection, safety to personnel, and low installation and maintenance costs.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

Investigate today the many advantages of using General Electric switchgear in your plant for efficient, flexible power distribution. Contact your G-E sales representative for further information—and write for the helpful bulletins listed below. *Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

GEA-4966 Low-voltage Switchgear
GEA-3642 Air Circuit Breakers
GEA-2017 Network Protectors
GEA-3083 Metal-clad Switchgear
GEA-3592 Load-center Substations
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GENERAL ELECTRIC

MD-19

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EACH JOB SEEMS TO SELL ANOTHER!"

says E. R. DAYTON, *Electrical Contractor*, Cape Cod, Massachusetts

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APPROVED BY UNDERWRITERS' LABORATORIES, INC.

- Uskon consists of rigid panels, ¼ inch thick, which become the ceiling, providing even, healthier, cleaner, trouble-free heat.
- Sold and installed by electrical contractors.
- Uskon now entering 4th successful winter in homes from coast to coast.

SUBSTANTIAL MARGINS OFFERED TO THE CONTRACTOR. For selling and properly installing Uskon, the electrical contractor receives a substantial margin. In commercial and industrial applications the profit opportunities are proportionately greater.

Take advantage of this opportunity to get into the heating business. Write Uskon, Graybar Electric Company, 420 Lexington Avenue, New York 17, N. Y., or direct to Electrical Wire and Cable Department, United States Rubber Company, 1230 Avenue of the Americas, New York 20, N. Y.

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The Sunshine Heat

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first again in APPLETON

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PAT. APPLIED FOR

Lighting fixtures that breathe . . .

Here are explosion-proof lighting fixtures that weigh thirty percent less than fixtures of similar performance rating, yet diffuse ten percent more light while operating at substantially reduced temperatures.

This improvement in performance and efficiency is achieved by the use in manufacture of porous metal cylinders —a method of construction that equalizes both temperature and pressure, *literally allowing the fixture to breathe.*

Appleton Vented Lighting Fixtures are another Appleton "first"—products of the same engineering skill that gave industry its first explosion-proof fluorescent fixture. Whatever your illumination or electrical fitting requirements, specify Appleton—pace-setting manufacturer of electrical equipment for nearly half a century.

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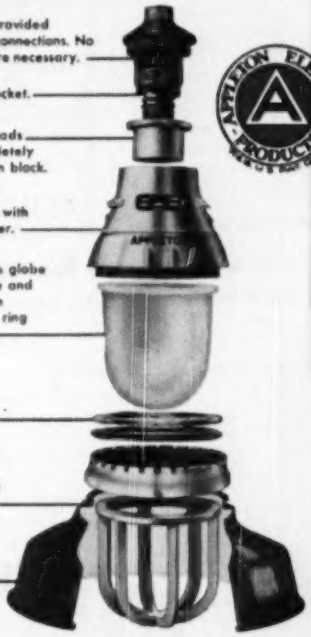
SECTIONAL CONSTRUCTION


Connection block provided in canopy for line connections. No other connections are necessary.
Shock-absorbing socket.
Metal cylinder threads onto canopy, completely enclosing connection block.
Dome unit complete with large porex cylinder.
Heat-resisting glass globe is clamped in place and detaches itself from fixture when lower ring is removed.
Gaskets — One Asbestos One Aluminum.
Reflector held with three screws. Can be removed without dismantling fixture.
Guard secured with fastening screws to lower clamping ring.

APPLETON

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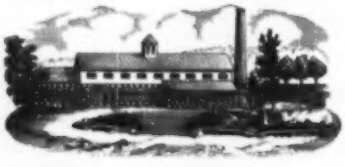
Time

Time is the measure of all things. Few of man's inventions can stand its merciless judgment. Yet Kerite for over 90 years has thrived and spread and gained renown. Time, indeed, gives Kerite its unqualified recommendation.



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Pacific Electric BREAKERS Have *The Features You Want*

Type JE-42, Rated 69 kv, 5 or 8 Cycle Interruption. Fast Reclosing Within 20 Cycles.

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1,000,000 interrupting kva

Type JE-42F
69 kv 1200 amps
1,500,000 interrupting kva

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Investigate their long-time record of trouble-free use on important 69-kv lines for proof of reliability and low maintenance . . . because of

1. **Motor - Compressed - Spring Closing** assures positive closing or reclosing if control power lost . . . easy manual recompression prevents shut-down if control power remains off.
2. **Single-Unit Rotary Structure**—moves as one piece—easy to inspect—high-speed "break" means quick interruption.
3. **Simple Interrupter Baffling** shows at a glance whether parts are "in order."
4. **Sliding-Shoe Nested Contacts** provide separate surfaces for arcing and load currents — eliminate static stress on bushings — no sensitive adjustment required to fix closed position — leaf springs apply nearly constant pressure requiring no adjustment during contact life — "wiping" assures clean contact.
5. **Low Operating Current** a-c or d-c.
6. **Shipped Assembled** — tested and adjusted.

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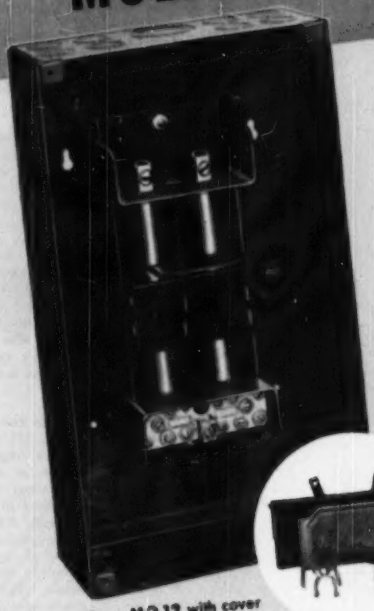
CENLACO a hot dipped galvanized and lacquered finish, inside and out.

CENTRAL WHITE electro-galvanized outside and black enameled inside.

CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.

NOW... "plug-in" type MULTI-BREAKER LOAD CENTERS



Type MO 12 with cover removed and additional unit ready for installation.

Start with 4 . . . Add More

Type MO 12 consists of box with bus structure and one 4-circuit "plug-in" unit in place. One or two additional 2 or 4 circuit units can be plugged on the bus structure—giving 6, 8, 10 or 12 circuits as required.

Plug-in Units are available in ratings of 15, 20, 30, 40 and 50 amperes, 120/240 volts A.C. Handle ties permit converting of adjacent poles of similar capacity on each breaker unit into double-pole, individual trip circuits. Breaker units are identical with those used in MO Panelette and NMO Panelboard. They are *individually packaged* but can be added to basic device carton, after selection.

3ø, 4 wire arrangement is also available.

Flush or Surface mounting. Either cover can be added to basic device carton, after selection.

Type MO 20 with cover on and all five 4-circuit units installed.

Type MO 20 is similar to type MO 12 but it provides space for as many as four additional 2 or 4 circuit "plug-in" units—giving 6, 8, 10, 12, 14, 16, 18 or 20 circuits as required.

Coilless THERMAL-MAGNETIC BREAKER UNITS GIVE 2-WAY PROTECTION

Thermal element responds to heating effects of both load current and surrounding atmosphere. *Total temperature* is limited to a safe value. **Magnetic** element responds instantly to heavy overloads or shorts. Damage is minimized.

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ELECTRICAL BOOKS

BASIC TELEVISION, by Bernard Grob, 596 pages, 6x9, McGraw-Hill Book Co., $6.50. A practical video and FM receiver servicing manual covering television from pickup and transmission of TV sound and picture signals through their output in FM and AM receiver circuits. Special chapters are devoted to: FM detection, including the ratio detector system and intercarrier sound receivers; deflection circuits, automatic synchronizing control and synchroguide systems; picture tubes, from the 3NP4 to the 16AP4 and 20BP4; optics and sequential and simultaneous color television. A knowledge of only arithmatic and simple algebra is needed to understand fully the subject matter.

ELECTRICAL ESTIMATING, by Ray Ashley, 312 pages, 7½x10, McGraw-Hill Book Co., $6.50. Contains all the information needed to estimate the cost of any electrical construction job quickly and accurately. Reflects 25 years of experience in all branches of the electrical-contracting industry by the author. Contains practical information to the contractor, estimator, and engineer who must solve daily complex problems of estimating, appraisal, cost accounting, job scheduling, or supervision. The book is invaluable to the electrical contractor or estimator who wants to become more expert at his job; supplies the know how that means safer and more dependable bids.

ELEMENTS OF THERMODYNAMICS AND HEAT TRANSFER, by Edward F. Obert, 372 pages, 6x9, McGraw-Hill Book Co. An important book designed for either a one- or two-semester course. It is a condensation of the author's Thermodynamics published in 1948. Designed to overcome the student's difficulty in understanding thermodynamics because of confusion created by the number of concepts and equations usually presented in the first few pages of many textbooks. The text stresses real machines, flow processes, properties of fluids, and the conditions where simplified analysis can be applied.

THE PROTECTION OF TRANSMISSION SYSTEMS AGAINST LIGHTNING, by Walter W. Lewis, 418 pages, 6x9, John Wiley & Sons, $8.00. Constitutes the first attempt to compress all the important information on lightning into a single volume. Information is assembled and applied in a practical way to the design and protection of transmission lines. There is a thorough discussion of various alternative methods of protecting transmission lines, both low- and high-voltage, stations and rotating machines. These methods include the use of protector tubes, ground fault neutralizers, and automatic reclosing. Field experience is cited to prove methods to be ample and dependable.

TRANSFORMER PRINCIPLES AND PRACTICE, second edition, by J. B. Gibbs, 236 pages, 6x9, McGraw-Hill Book Co., $3.50. The book deals with all aspects of construction and use of transformers, including the underlying principle, applications, connection, testing, care and economics. Mathematics is avoided in a well-illustrated, simple treatment of the subject. This revised second edition includes a new chapter on current-limiting reactors and many new illustrations showing up-to-date construction where improvements have been made in former practice.

WE LINED UP THE FLUX PATH

TO CUT DOWN SIZE!

Twelve years ago, General Electric introduced the Spirakore transformer. It was revolutionary! It was the first distribution transformer in which the flux through the core followed grain direction of the steel. Literally, the crystals of cold-rolled steel were lined up to provide the best possible flux path and then, by spirally winding the core, we lined up the steel so the flux would follow this path. Magnetic properties of the steel were so improved that we were able to build a much smaller, lighter transformer—that sold at a much lower price.

Now many *small* distribution transformers are built along these lines. But General Electric has not stopped here. By adapting this same principle to larger cores, we have brought weight savings to the entire line of single-phase, outdoor distribution transformers—up through 500 kva. Nor did we stop with the core. We improved the impulse strength of the coils—improved the clamping construction for greater mechanical strength. We sealed the tanks to prolong oil life—and even developed a new, better synthetic resin paint that is baked on, and which reduces maintenance costs.

Today—as twelve years ago when lighter, smaller Spirakore transformers made history—Spirakore still leads the field—the finest distribution transformer we have ever made, the finest you can buy. Ask for bulletins GEA-4885 and GEA-4521. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

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INTER-MATIC TIME SWITCHES

A COMPLETE LINE

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- DOUBLE POLE
- POULTRY DIMMER
- LOW VOLTAGE
- DOUBLE THROW

with these OUTSTANDING features:

1 ***Interchangeable Switches***
Any model can be converted to any other model simply by changing switch assemblies.

2 ***Plug-in Adapter***
Any model can be converted to a portable plug-in unit by merely attaching a few small parts.

3 ***Front Mounted Motor***
A front mounted motor with an observation window enables immediate checking of operation without removing the mechanism.

4 ***Wide Application***
Up to 12 "on" and "off" operations every 24 hours—no special dial is required when adding trippers.

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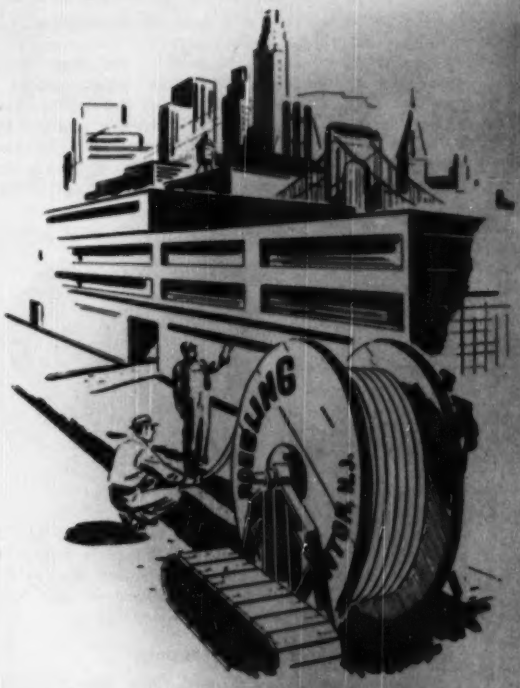
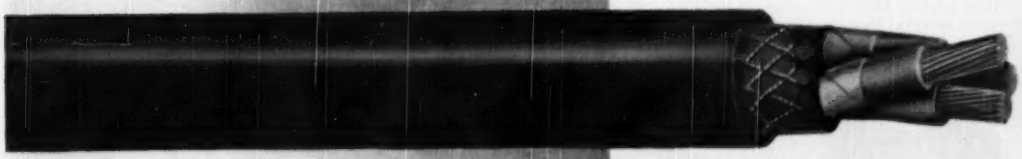


Why men who watch costs specify Roebling ROEPRENE Parkway Cable

THERE'S ONE BIG and deciding reason for choosing Roebling ROEPRENE Parkway Cable . . . it enables you to avoid the expense of underground duct systems! This cable is made for direct underground installation. Only a two- or three-foot trench is needed. And as soon as the cable is out of sight, you can put it out of mind. There'll be no service troubles from wind or weather . . . safe physical protection is assured by the non-metallic armor of a ROEPRENE sheath.

Roebling ROEPRENE Parkway Cable has rapidly become a top choice for series street lighting, parkway boulevard lighting, traffic signal, fire alarm, flood lighting, railroad yard, signal and many other circuits. It is available in single and multiple conductor types—solid or stranded—in a range from 600 to 5,000 volts.

Have your Roebling distributor or Roebling branch office help select the best cable for your special needs. John A. Roebling's Sons Co. of Calif. — San Francisco — Los Angeles — Seattle — Portland.



From copper rod to finished cable all components of Roebling electrical wires and cables are manufactured in Roebling's own plants. Painstaking care, research, engineering and modern precision machines are your assurance of highest quality.

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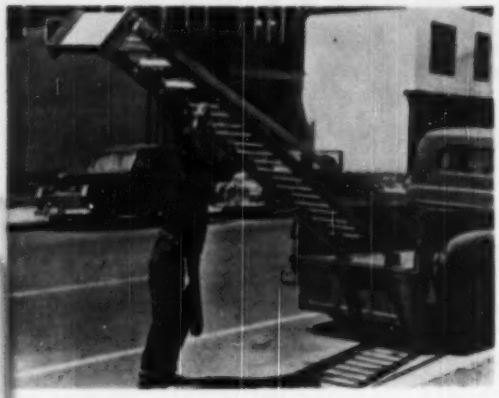
PRODUCT NEWS



Aluminum Truck-Mounted Ladder For Street Lighting Service

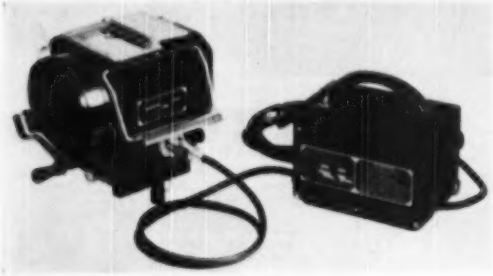
(200) Line material Co., Milwaukee 1, Wis.

By mounting this aluminum ladder on the bed, any truck, regardless of size, may be converted into a street lighting servicing unit, according to the manufacturer. Rungs are corrugated for safe climbing and the last two at the top are flat to give steady footing for maintenance work. Eight insulating units are located at strategic points on ladder and guys. Ladder is mounted at an 18° angle from the rear of the truck bed so that luminaires can be serviced even though autos are parked in the vicinity. With this arrangement, the truck may be positioned in the street, perpendicular to the curb line, or parallel to the curb. Two sections are 12 and 14 ft. respectively. When fully extended, ladder can be used for servicing luminaires up to 25 ft. from the ground. Weight of ladder is 117 lb.

Dual-Operated Megger

(201) James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.

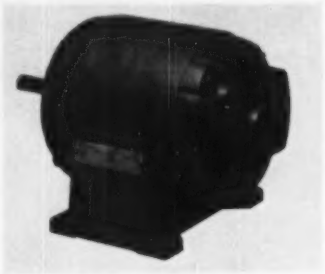
The hand-cranked Meg-type Megger is now available in a combination hand-crank and rectifier-operated set. It consists of the Meg-type constant-pressure test set and a separate rectifier that supplies 500 volts d-c from any 115-volt a-c, 60-cycle outlet. One cord from the hand-crank instrument and another from the rectifier to an a-c outlet eliminates hand operation. According to the manufacturer, the new instrument will be most useful in communications and in extensive cable wiring and control installations, where many tests are to be made and where an a-c outlet is readily available; and will be a boon where continuous operation of the instrument is desired.



Single-Phase Capacitor Motor

(202) General Electric Co., Schenectady 5, N. Y.

For use where power supply demands single-phase operation, this integral-horsepower capacitor motor is of cast iron construction, weighs 15 to 20% less than the old model. To minimize over-all dimensions, capacitors are mounted in the base of the motor, and there is no conduit box on the side. The conduit box has been replaced by a built-in terminal board inside the end shield for easier wiring. A totally enclosed built-in starting switch keeps foreign matter from contacts, and the centrifugal mechanism is designed for long life.

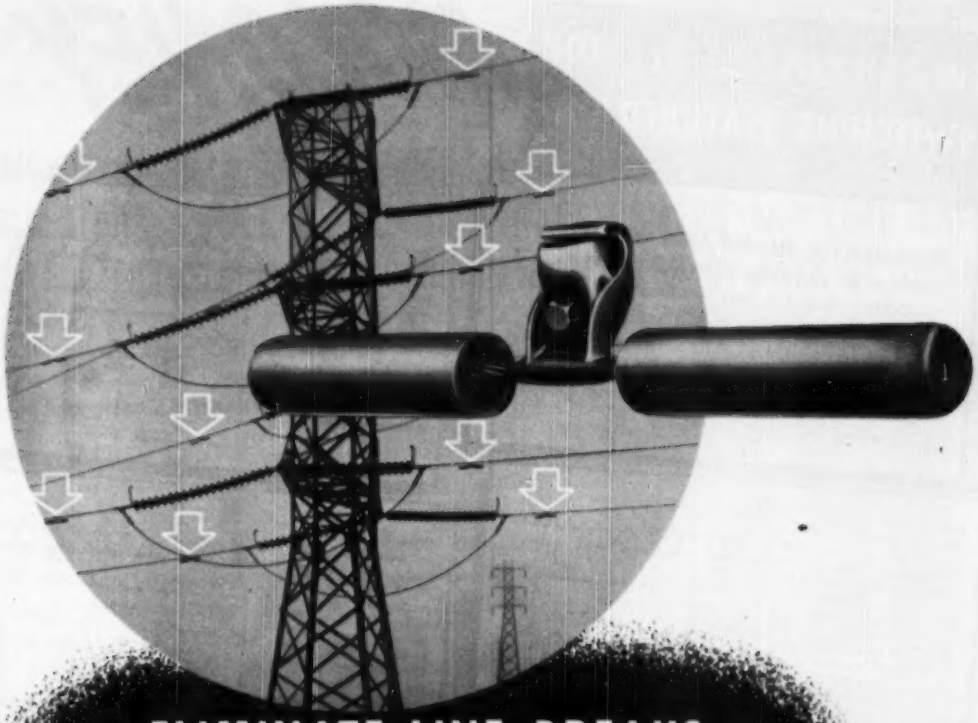


In ratings from ½ to 5 hp., these high-torque motors are available in two types: type KCS, capacitor start, and type KCR, capacitor run. According to the manufacturer, these differ only in starting current, not in output characteristics. The KCS is designed for 115/230 volts; the KCR is a single-voltage, 230- volt design. The motor is dynamically balanced, features the Tri-Clad triple protection against physical damage, electrical breakdown and operating wear and tear.

Semiburied Transformer Housings

(203) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Semiburied housings for standard overhead-type distribution transformers are announced for inexpensive underground distribution with buried cables in residential districts. Transformer housings consist of two sections. The transformer rests on two rust-proofed channels supported by a ledge in the lower section. All connections to the transformer may be made before the upper section is put into place. Guide rods prevent the metal housing from coming in contact with live parts during lifting. The new housings accommodate transformers up to and including 50 kva. Since they extend only 35 in. above ground level, they can be concealed in shrubbery. The lower section is of cast concrete, the steel form for casting being available from Westinghouse. Upper section is a Bonderized and painted steel shell, weighing approximately 100 lb. This section is fitted into lugs to engage a ledge on the concrete shell.



ELIMINATE LINE-BREAKS
with STOCKBRIDGE VIBRATION DAMPERS

Resiliently mounted counterbalances absorb destructive line vibrations before they can strike at vital points of support. Fatiguing oscillations are prevented from building up into dangerous amplitudes. Installation of Stockbridge Vibration Dampers is fast and simple. Without interrupting service or disturbing existing suspension or dead-end clamps, they're quickly set in place with standard hot-line tools. Since vibration presents a hazard on every line, specify this maximum protection on all new and existing installations. Stockbridge Dampers are manufactured by Hubbard and Company, whose engineers are trained to help you analyze your line vibration problems. Consult them now, or contact your nearest representative of Graybar Electric Company, Inc., or General Electric Supply Corporation.

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PITTSBURGH OAKLAND, CALIFORNIA CHICAGO

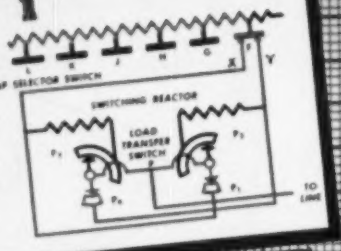
HANG THE LOAD ON HUBBARD HARDWARE

NEW PRINCIPLE OF REACTOR SWITCHING FEATURED ON MOLONEY

SCHEMATIC DIAGRAMS showing sequence of switching operations and how Switching Reactor loss is eliminated in all operating positions on 1¼% step voltage regulating apparatus and in half of the positions on ⅝% step voltage regulating apparatus. Colored lines indicate paths of current.

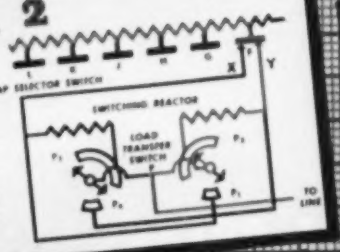
1

Switch positions for Load Tap Changer Operating Position No. 1 on either ⅝% or 1¼% step voltage regulating apparatus (assuming Reversing Switch is in Buck position). A 10% voltage buck is provided in this position. Note that reactor is by-passed.



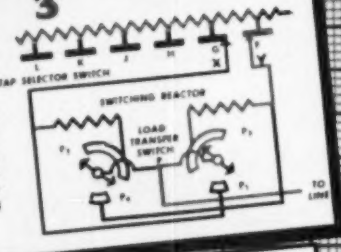
2

Assuming there has been an increase in load and the line voltage decreases, the Automatic Control, after a time delay, actuates the driving motor. The motor drive mechanism rotates the Load Transfer Switch 45° counter-clockwise, shunting all of the current through one half of the Switching Reactor.



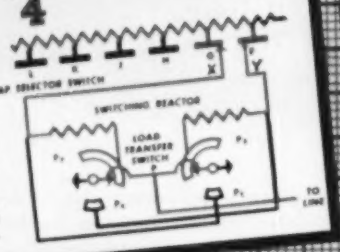
3

While the Load Transfer Switch remains in the position shown in Fig. 2, the motor drive mechanism continues to operate and rotates the Tap Selector Switch to the bridging position illustrated above. No arcing takes place since no current is flowing through moving contact X.



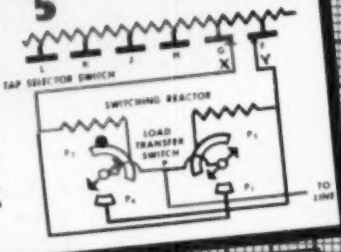
4

Load Transfer Switch rotates 45° counter-clockwise causing current to flow through both halves of reactor. Load Tap Changer is now in bridging position which is Operating Position No. 2 on ⅝% step apparatus and tap change has been completed. On 1¼% step apparatus this is a transitory position.



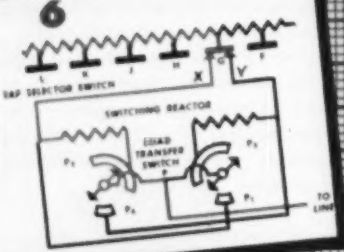
5

On 1¼% step apparatus the motor drive continues to operate and rotates the Load Transfer Switch 45° counter-clockwise, again shunting all of the current through one half of the reactor in preparation for the movement of the Tap Selector Switch to its next position.



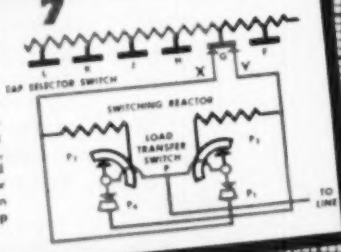
6

With no current flowing through moving contactor Y, the Tap Selector Switch now moves to the next position with X and Y on stationary contact G.



7

Next, the Load Transfer Switch rotates 45° counter-clockwise to complete the tap change. There is no reactor loss since the current flows through parallel by-passing circuits X, P_1, P and Y, P_4, P to the line. Load Tap Changer is now in Operating Position No. 2 on 1¼% step apparatus.



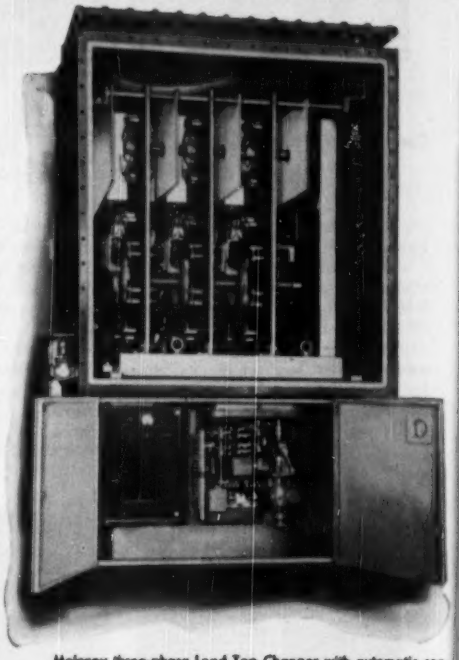
Another Superior **MOLONEY** *Product*

LOAD TAP CHANGERS

"M" SERIES LOAD TAP CHANGERS USED ON MOLONEY STEP VOLTAGE REGULATORS, POWER REGULATING TRANSFORMERS AND LOAD RATIO CONTROL TRANSFORMERS INCORPORATE REACTOR BY-PASS SWITCHING

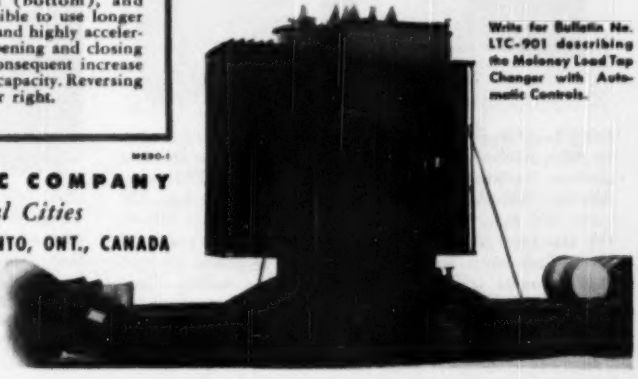
SWITCHING REACTOR LOSSES ARE *ENTIRELY ELIMINATED* ON VOLTAGE REGULATING APPARATUS WHEN REGULATION IN 1¼% STEPS IS USED

Moloney "M" Series Load Tap Changers are provided on Load Ratio Control Transformers, Power Regulating Transformers, and medium and large ratings of Step Voltage Regulators. A separate switch is used for breaking load current, a feature heretofore supplied on only the very large ratings of regulating apparatus. The design of this switch and the timing of its operation in conjunction with the Tap Selector Switch, are such that the Switching Reactor is by-passed in *all* operating positions on 1¼% step apparatus and in *half* of the positions on ⅝% step apparatus. Since no current flows through the reactor when it is by-passed, there are no reactor losses. How by-passing is accomplished and the sequence of operations in changing from one tap position to another, is illustrated on the opposite page.



Moloney three-phase Load Tap Changer with automatic controls. Top assembly contains Tap Selector Switch, Load Transfer Switches and Reversing Switch. Motor drive and auxiliary equipment are at lower right. Automatic controls are at lower left. Moloney Automatic Control equipment features a supersensitive voltage regulating relay and an electronic time delay circuit. A complete line of remote-manual and automatic controls and associated equipment is available.

The Tap Selector Switch on Moloney Load Tap Changers does not have to perform the dual function of breaking current and changing taps. A separate Load Transfer Switch (upper left) makes and breaks the circuit, eliminating all arcing duty from the Tap Selector Switch (bottom), and making it possible to use longer arc clearances and highly accelerated breaker opening and closing speeds, with consequent increase in interrupting capacity. Reversing Switch at upper right.



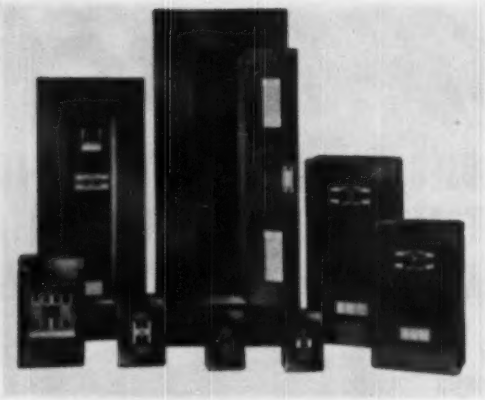
Write for Bulletin No. LTC-901 describing the Moloney Load Tap Changer with Automatic Controls.

MEDO-1

MOLONEY ELECTRIC COMPANY

Sales Offices in all Principal Cities

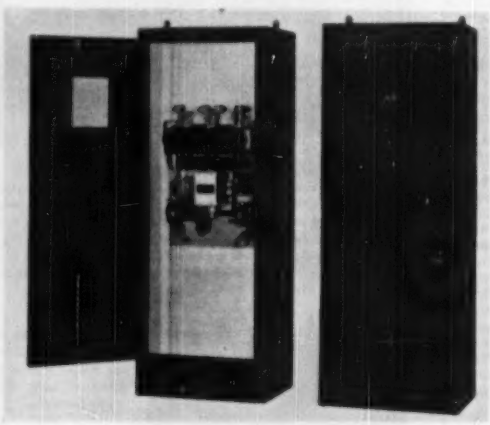
FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA



New Multibreaker Line

(204) Square D Co., 6060 Rivard St., Detroit 11, Mich.

New multibreaker line, above, will handle from 1 to 42 lighting and appliance circuits. It features the thermal (coilless) magnetic multibreaker design, ranging from the single-circuit MO-1 through the MO-2, -4, -8, -12, -20 and NMO panelboard. The first three are for small homes. The MO-8 has the single-pole "ad-on" breaker unit. Starting with a minimum of four circuits on the basic device, four more single-pole circuits can be added to the same box for future home requirements. The MO-12, -20 and NMO panelboards are for large homes, commercial buildings and factories. Flexible plug-in multibreaker units can be plugged in on round bus bars, in 2-circuit steps.

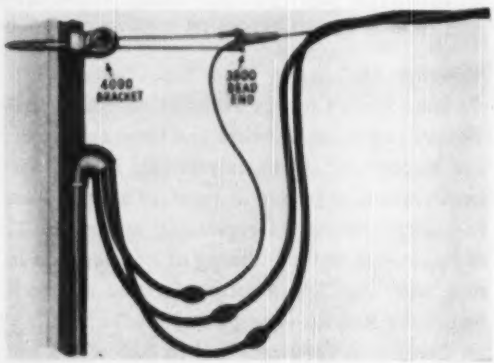


(205) Two larger units, Sizes 6 and 7, have been added to Allen-Bradley's Bulletin 709 a-c, across-the-line solenoid starters. Ratings: Size 6, 600 amp., 200 hp., 220 volts; 400 hp., 440-550 volts; Size 7, 900 amp., 300 hp., 220 volts; 600 hp., 440-550 volts. Switch construction follows the standard solenoid design for the company's sizes 0 to 5. Both units have the one-piece magnetic plunger that operates with a vertical straight-line motion. Contacts are fully enclosed, double break, silver alloy; all terminals and wiring are accessible from the front. Further details available from the company at Milwaukee

Voltage Regulator

(206) General Electric Co., Schenectady 5, N. Y.

This type ML-8 step-type branch line voltage regulator provides the narrower band width of 8-step regulators for the same price previously made for the 4-step design. Superseding the type ML-4, this unit provides a total of 10% regulation in eight 1¼% steps, in any of the following combinations: 10% raise, 7½% raise to 2½% lower, 5% raise to 5% lower, 2½% raise to 7½% lower or 10% lower. It is available in selected kva. sizes in 2,500-, 5,000- and 7,620-volt ratings and corresponding Y-connected voltages. A "load-bonus" feature permits increase in current-carrying capacity up to 160% for the connection arrangement of 5% raise to 5% lower. Details in bulletin GEA 5417, offered by the manufacturer.



(207) This service-drop automatic dead end is for use with preassembled messenger-supported cable. Assembled as a one-piece unit, the Series 3800 dead end has one end of the flexible bail detachable for installation around a spool-type insulator or other supporting anchorage. The 4000 series service-drop anchor bracket, a one-piece, light-weight unit, permits insertion of a closed bail or loop without opening the loop, is said to support the cable at any angle. Details are available in a bulletin from Electroline Co., 4121 S. La Salle St., Chicago 9, Ill.

(208) This engine hood heater consists of a specially designed channel into which are fitted three standard infrared lamps. The heater is suspended by chains from the garage rafters with the lamps 10 to 12 in. above the hood surface. Mounting chain, 6-ft. Rubber cord and three lamps come with the unit. Lamps are rated at 2,500 hours. Electrical connections are Underwriters' approved. Wagner-Green Co., 1935 Euclid Ave., Cleveland 15, Ohio

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Push-button switch with automatic protection for electric circuits.

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Featuring automatic protection and push-button switching, revolutionary Pushmatics are just as easy to order and install as fuses. Individual 1-pole units are easier to add or interchange than multiple units.

There's a Pushmatic to meet every load condition: THERMAL ONLY, THERMAL-MAGNETIC, and THERMAL-MAGNETIC with exclusive AMBIENT COMPENSATING FEATURES. All are identical in size and contour, in ratings of 15, 20, 30, 40 and 50 amperes, 120 V., 1 pole, or 120-240 V., 2 poles, AC. All are interchangeable for rating and type.

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2300 East 27th Street Tel. Logan 5-5331
Los Angeles 11, Calif.

what's **New** in street lighting

A MULTIPLE SWITCH that plugs into a standard watt hour meter socket

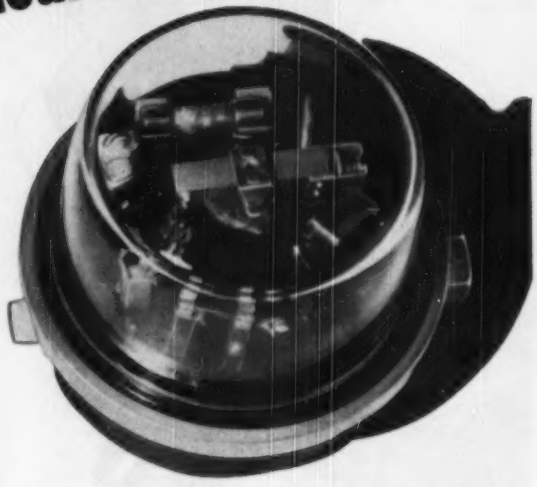
Here's a switch for multiple-circuit street-lighting loads designed to save your maintenance dollars. It has all components permanently wired on a molded base. For easy maintenance, the base is jack-mounted. A glass cover protects the elements yet affords a quick inspection.

Ease of Maintenance—Should a switch become defective, the entire control element of the switch can be unplugged instantly and a new element plugged in. Just as quick and easy as that—no tools needed—no failure-inviting field repairs.

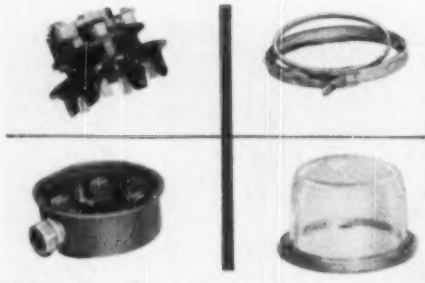
Quick Inspection—On routine field inspection trips, the glass switch cover enables maintenance men to check immediately the condition of all elements.

Standardization—Most standard watthour meter sockets and glass covers can be used to house the new plug-in control element.

For complete information, write *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*



A single-pole, single-throw, double-break magnetic switch for controlling low-voltage multiple-circuit lighting loads up to 30 amperes. Can be operated by pilot-wire or cascade connection, indoor or outdoor mounting.



The disassembled switch shows a standard watthour meter socket, cover glass, clamp band and control element. Notice the molded control element base is jack-mounted for easy, instant connections.

GENERAL ELECTRIC

452-19

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

NOW for the first time...

...A HIGH-VOLTAGE INSULATION WITH ALL THE PROPERTIES NECESSARY FOR TROUBLE-FREE SERVICE UNDER ALL OPERATING CONDITIONS...

LOW WATER ABSORPTION

OZONE RESISTANCE

RESISTANCE TO HEAT and AGING

SIMPLEX-ANHYDREX XX

Here at last, in the new Anhydrex XX insulation, is the combination that assures dependable, low-cost cable performance under all conditions of high-voltage service. And in Anhydrex XX none of the effectiveness of one property has been sacrificed to gain the others.

Aged in an air oven for sixteen weeks at the grueling temperature of 250 F. (121 C.) Anhydrex XX remained rubber-like in quality and appearance, was still suitable for continued use. It retained approximately half of its tensile strength, nearly two-thirds its elongation. Most important of all, its rate of deterioration after the first few weeks was very slight, indicating exceptional stability and long life.

Ordinary oil base and heat-resistant compounds could not match this performance. Inside of only three weeks both had become brittle and, upon bending, immediately cracked and crumbled.

Aged at the same high temperature for seven days, Anhydrex XX was immersed for a week in distilled water at 158 F. (70 C.). It would not absorb more than 15 mg. per square inch of exposed surface. Bent around a mandrel, it was exposed to .03% ozone for four hours yet would not crack.

Anhydrex XX is the only insulation that provides this valuable combination. So that you may determine fully the effectiveness and stability of these properties even after years of service, we have drawn up an ironclad specification for Anhydrex XX which we will gladly send you upon request. Simply fill in and mail the coupon below.

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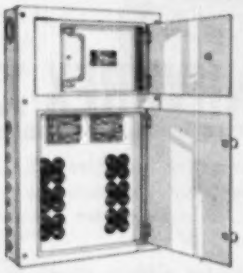
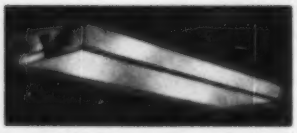
WHAT
IS COMING OUT?

A Sensational
New Development
by
BRONCO
Watch for It
In This Publication
WESTERN INSULATED WIRE CO.

(209) This Sten-x-Lite is claimed to give proper light on copy, typewriter and desk; is designed for stenographer, student, or may be used in counter displays. Light is a T-8, 15-watt F lamp for 115-volt, 60-cycle a-c. May be used for d-c by adding plug-in resistor. Stand holds copy, text book or display card. Portable unit is finished in office-grey wrinkle. Made by Fostoria Pressed Steel Corp., Fostoria, Ohio



(210) This new 200-amp. fusible service equipment has range, water heater, lighting and heater circuits in one cabinet, for surface and flush mounting. Complete details are available in a publication from Wadsworth Electric Mfg. Co., Inc., Covington, Ky.



(211) This flat-bottom unit has a hinged Corning Albalite bottom panel and flat glass side elements to give slim appearance. Comes in ivory or silvertone finish; in 2- and 3-light types in standard fluorescent and slimline for ceiling or 024 canopy suspended mounting. Provision is made for continuous runs; starters are accessible without removing lamps. Designated series 1040 and made by Sunbeam Lighting Co., 777 E. 14th Place, Los Angeles 21, Calif. Literature available

(212) A slotted, bolt-tightened wedge is claimed to make a quickly assembled permanent and positive connection between conductor and ground in this new drive head ground rod. (below) Ground connection is made by inserting the conductor in the slotted plug and tightening the bolt through the plug, wedging the ground wire tightly to the rod. This product is made by the A. B. Chance Co., Centralia, Mo.

(213) QUICK CLAMP CONNECTOR—For use on all standard No. 18 two-conductor rubber-, plastic- or rayon-covered parallel cords, a connector with the Quick Clamp feature has been introduced as a companion to the Quick Clamp cap announced recently. Cord is inserted through side of connector and clamp is closed to make electrical contact. With connector and cap, an electric cord may be wired in a few seconds, it is claimed. Underwriters' approved. Monowatt Inc., 66 Bissell St., Providence, R. I.

(214) GROUND CLAMP—An adjustable ground clamp is available in two sizes: to fit ⅜- to 1¼-in. pipe, and ⅜- to 3-in. pipe. A tightening screw chafes the pipe, draws up slack, cuts through rust and dirt and, at the same time, contracts band around pipe surface. Underwriters' approved. Blackburn Specialty Co., 6541 Euclid Ave., Cleveland 3, Ohio.

215) SPOT—A new 300 watt R-40 reflector spot light has a heat resistant glass bulb and mogul screw base; is a companion to a flood lamp of the same size and wattage. General Electric Co., Nela Park 12, Ohio.

(216) SLIM FLUORESCENT—An improved fixture features a simplified method of relamping, cleaning and ballast replacement. Reflectivity is given as 89%; ETL efficiency rating, 84%, built for new 425-ma. ballast; available in 8- and 4-ft. models for single-pin slim T 12 lamps. Cornwall Fixture Corp., Cornwall, N. Y.

(217) CAPACITORS—Electrolytic capacitors (type 11A) for 115-volt continuous duty, a-c service are claimed to be ideally suited for across-the-line power factor improvement at low voltages, particularly with appliances and light industrial equipment. Ratings and details in Bulletin 301 from Sprague Electric Co., North Adams, Mass.

NOW ..all types of Sangamo Watthour Meters available for convenient *SEMI-FLUSH* mounting on modern switchboards!

The complete, service-proved line of Sangamo Watthour Meters is now available for semi-flush mounting on modern switchboards.

Type LCF meters, for polyphase circuits, and Type JF meters, for single-phase circuits, are built in all current and voltage ratings for which standard service type watthour meters are made —all require the same minimum switchboard area. These meters are offered with either kilowatthour registers or with registers measuring both kilowatthours and kilowatt demand. Type D5F, two-wire, direct current meters are also furnished in the new design.

Sangamo Meters for semi-flush mounting fit a 6⅜" x 6⅜" opening in the panel and mount with two screws. The cover can be easily removed to permit ready access to the various adjustments for full load, light load, power factor and element balance without removing the meter from the panel. All adjustments can be made from the front with a screwdriver. A micrometer slide-wire device is provided for making accurate power factor adjustments.

Bulletin No. 270 gives complete information. Write for your copy.

SANGAMO

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Controls for fire-fighting equipment manufactured by Maxim Motor Co. are safely insulated with "SCOTCH" No. 33 Electrical Tape. Plastic backing of tape resists water, oil and most chemicals.

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on tape-insulated wires

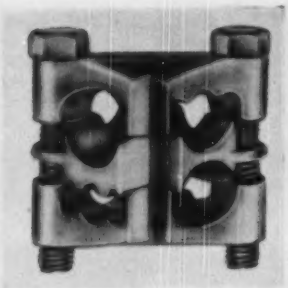
Dependable insulation on fire-fighting equipment calls for "SCOTCH" No. 33 Electrical Tape at Maxim Motor Co., Middleboro, Mass. Mr. S. H. Flanders, Purchasing Agent, writes—"Our products require the highest quality materials and workmanship attainable, and your tape fully meets these qualifications. It's the best."

Why not give "SCOTCH" Electrical Tapes a try on your next job? There's one designed to save you time and money on practically every insulating problem. Just write Dept. EP-2 for complete information. No obligation.

Made in U. S. A. by **MINNESOTA MINING & MFG. CO.,** St. Paul 6, Minnesota

also makers of other "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: DUREX ABRASIVES CORP., New Rochelle, N. Y.
In Canada: CANADIAN DUREX ABRASIVES LTD., Brantford, Ontario



(218) Known as the Multitap, this multiple-purpose connector comes in three sizes, accommodates a range of wire sizes from No. 1 strand to 1,000 MCM on the main circuit and from No. 6 solid to 1,000 MCM on the tap circuit. It is applicable for cross, parallel, tee and end-to-end connections on copper-to-copper conductors and aluminum-to-aluminum conductors. Data available from W. N. Matthews Corp., 3850 Delor St., St. Louis, Mo.

(219) TAPE—Polyken corrosion protection coating claimed to give complete protection in a single operation, requiring no heat, flame, solvents or greases, is an oriented polyethylene film with a synthetic adhesive applied to one side. Bauer & Black, Polyken Industrial Tape department, 222 W. Adams St., Chicago 6, Ill.

(220) PULL SWITCH—For use where space is limited, a 100-amp. pull switch has been added to the Noark line. It is dead-front, with phenolic shield covering live parts. Available in three types of enclosure—surface, flush and raintight. Federal Electric Products Co., Newark, N. J.

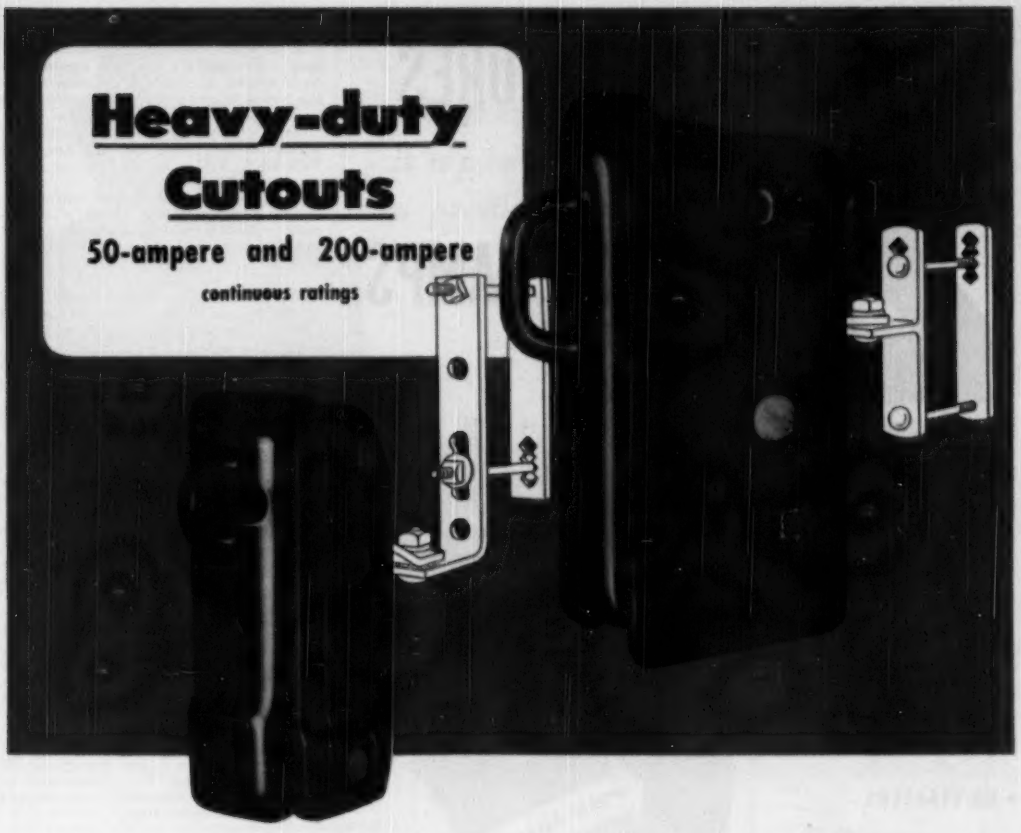
(221) HARD HAT—A resin-impregnated Fiberglas crown developed for the safety hat is said to be impervious to moisture and acids and to pass all dielectric tests. It is non-shattering and will not deteriorate with age, it is claimed. Comes in colors. E. D. Bullard Co., 275 Eighth St., San Francisco 3, Calif.

(222) RESISTORS—Bulletin 35 Edgeohm high-current resistors are obtainable in four shorter lengths: 6, 9¼, 12½ and 15⅝ in., as well as the 19-in. length previously listed. The four new sizes extend the minimum resistance value per unit from 0.35 to 0.05 ohms. Ward Leonard Electric Co., Mount Vernon, N. Y.

(223) F LAMP—A soft white fluorescent lamp producing a peach-tinted light has been developed by Westinghouse Lamp Division, Bloomfield, N. J.

(224) LIGHTING—The Guth line of two and four 40-watt fluorescent lighting equipment is available for the new 4-ft. single-pin slimline lamps. Edwin F. Guth Co., 2615 Washington Ave., St. Louis 3, Mo.

(225) SWITCHES—A new 30-amp. front-operated toggle, plug fuse safety switch is available with or without dead front plate; has easily removable laminated arc shields, snap action full-floating contacts, solderless pressure wire connectors on the line side. All parts are visible and accessible. General Switch Corp., Brooklyn 11, N. Y.



. . . both having 8000-RMS-ampere interrupting capacity

Here are two heavy-duty enclosed indicating fuse cutouts for high power capacity distribution feeders. They have interrupting ratings of 5000-rms amperes at 5000 volts (or line-to-neutral of 8330-volt grounded wye systems) and 8000-rms amperes at 2500 volts (or line-to-neutral of 4160- or 4330-volt grounded wye systems).

Cutout shown on the left is the new heavy-duty 50-ampere unit —for all who want *high interrupting capacity* without paying for unneeded high continuous current rating.

Cutout shown on the right is the standard heavy-duty 200-ampere indicating unit incorporating recent improvements in door and swivel hanger support.

Both units have housings of wet-process porcelain, glazed inside and out, with hanger support cemented into back—doors of molded Textolite, compound—and fuseholder tubes of laminated linen-base Textolite and fiber, easily replaced and with exceptional resistance to both weathering and arcs—and both have spring-operated indicator arm to pull cable downward and completely out of tube —assuring quick interruption even at low currents.

For details and prices ask for Bulletins GEA-3688 and -5019. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

400-AMPERE DISCONNECTING BLADE FOR 200-AMPERE CUTOUT

Simply by changing the door, the 200-ampere fuse cutout can be converted to a 400-ampere disconnecting cutout. This unique disconnect door can be closed, with the hinged blade in open and completely isolated position to give positive indication that the circuit is open.

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With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

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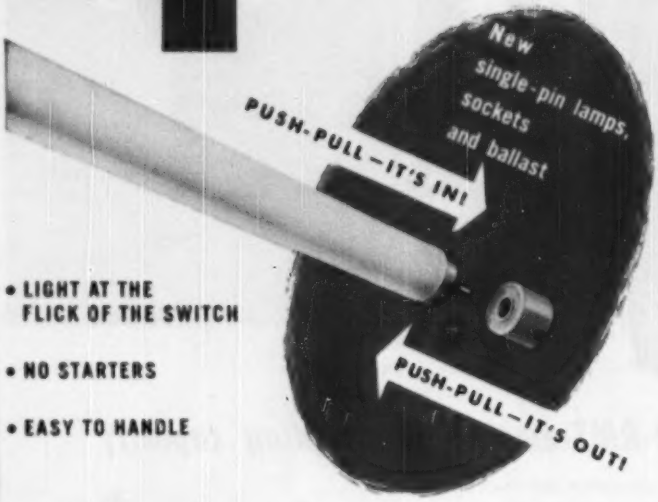
for 4 ft.
SLIMLINE LAMPS



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• NO STARTERS
• EASY TO HANDLE

Here's the biggest fluorescent news in years: you can now use the new 4-ft., 425 ma. T-12 Slimline Lamps in every fixture of the entire GUTH fluorescent line. And the 4-ft. Slimline is efficient! Same lumen output per foot as the 8-ft. Slimline.

Now you have your choice:
the 4-ft. Slimline
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in GUTH fluorescent fixtures.

For full details, call your nearest GUTH resident engineer or write

Guth LIGHTING
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Leaders in Lighting Since 1902

148

(226) PLASTIC INSULATED WIRE—A tinned-copper conductor, with insulation of 1/32-in. wall of specially compounded stabilized vinyl dielectric has been approved by Underwriters' for 105°C continuous operation. It is claimed that this conductor is free-stripping and permits practical applications in soldering operations. Product of William Brand & Co., 276 4th Ave., New York 10, N. Y.

(227) OILER—For shafts and bearings requiring a small amount of oil, a shatterproof underfeed oiler is available in 1-, 2 and 4-oz. sizes from Trico Fuse Mfg. Co., 2948 N. 5th St., Milwaukee 12, Wis.

(228) TOOL—A small hand Hytool for installing Hydent connectors is constructed of lightweight aluminum alloys. Three grooves in the jaws accommodate connectors for No. 9 (19/22 control), 8, 6 and 4 stranded commercial and aircraft copper conductors. Die grooves install the entire range without adjustments. Burndy Engineering Co., 107 Bruckner Blvd., New York 54, N. Y.

(229) LAMPHOLDER—A combination keyless ceiling lampholder is claimed to be quickly and easily wired. Four over-size screws are used to simplify through-circuit connections. It comes in two sizes: No. 276 (4½-in. diameter) and No. 277 (5-in diameter; in heat-resistant white bakelite. Slater Electric & Mfg. Co. Inc., 56th St. and 37th Ave., Woodside, N. Y.

(230) TRANSFORMERS—Jefferson has extended its power circuit transformer line to include 7½-, 10- and 15-kva. sizes. Wiring compartments are provided for both primary and secondary connections with ½- and ¾-in. knockouts. Primary voltage is 460/230, secondary 230/115; 50/60 cycles.

(231) TOOL KIT—A new line of TV-FM alignment tools has been announced by Walter L. Schott Co., 9306 Santa Monica Blvd., Beverly Hills, Calif.

(232) BOX—An improved switch box is claimed to give faster installation with perfect alignment at lower cost. Nail holes in box sides eliminate need for mounting bracket. Three nubs facing outward on each side of box keep it from tilting when nailed to studding. First nub is ¾ in. from front of box to allow ample adjustment for wallboard or plaster. M. B. Austin Co., Northbrook, Ill.

(233) OILER—An insulated oiler to oil high-voltage mechanisms while energized is available in two lengths, 4 and 6 ft. Pole is made of 1¾-in. laminated spruce; operating rod is of maple and oil container of clear lucite. Container will hold ¼ pt. of oil.

(234) TAPE—Plastix, a new electrical tape, is said to be thin in construction and high in dielectric resistance; to have as high as 200% stretch. It resists water, oil, acids, alkalies and corrosive chemicals. Comes five rolls in screw cap container. Van Cleef Bros., 7800 Woodlawn Ave., Chicago, Ill.

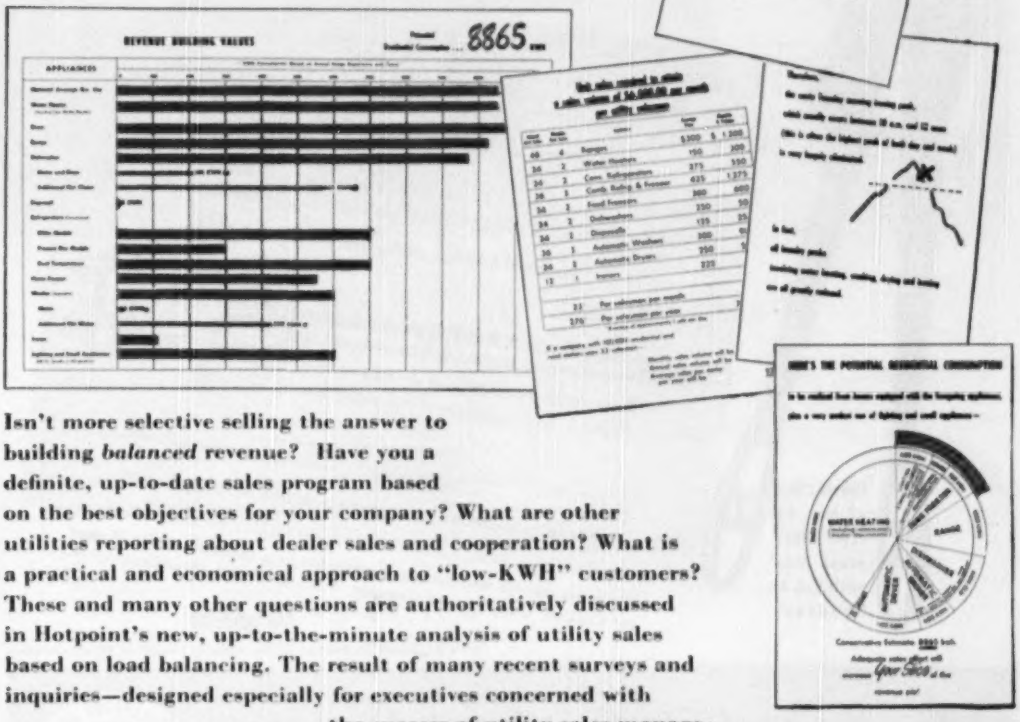
(235) LADDER—A hydraulic ladder attachment that automatically corrects unlevel ground conditions is constructed of steel for working loads of more than 500 lb.; weighs 6 lb. Anderson Products Co., P. O. Box 691, Tulare, Calif.

(236) LAMP BULB—A 100-200-300-watt 3-light bulb is designed to be glare free; has mogul base, special bowl shape bulb to eliminate use of heavy glass bowl reflector in table and floor lamps. Solar Electric Corp., Warren, Pa.

"Hotpoint's new load-building study is a powerful aid in planning a productive sales program."

Robert C. Hienton
General Sales Manager
The Cleveland Electric Illuminating Company

...thank you, Bob Hienton. We believe every utility sales executive who sees it will agree with you.



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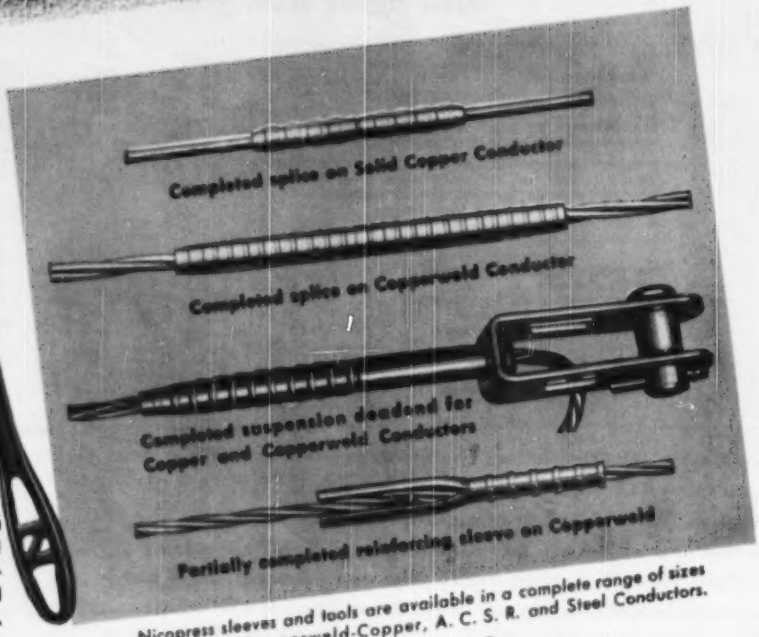
"JOB PROVEN" THE WORLD OVER Nicopress

Illustration of No. 51 type Nicopress tool with P. & J. Grooves.


Completed splice on Solid Copper Conductor
Completed splice on Copperweld Conductor
Completed suspension deadend for Copper and Copperweld Conductors
Partially completed reinforcing sleeve on Copperweld

Nicopress sleeves and tools are available in a complete range of sizes for Copper, Copperweld-Copper, A. C. S. R. and Steel Conductors.

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OF HIGH POWER
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BULLETINS ETC.

(237) STARTER — Oil-immersed, full-voltage type 371 wall-mounted starter for control of squirrel-cage motors and primary of wound rotor motors of 350 hp. or less at 2,300 volts is described in Bulletin 1487274 from Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

(238) RECLOSER — Bulletin B-4339 of Westinghouse Electric Corp., Box 1017, Pittsburgh 30, Pa., describes operation of the company's 100-amp. type GR recloser. Diagrams and drawings help explain each step. A table shows minimum tripping currents for the five coil sizes and maximum interrupting capacities at common operating voltages.

(239) SHADED-POLE MOTORS—Dimensions, ratings and construction features of type 350, two-pole skeleton frame shaded-pole induction motors are given in Bulletin 2000 of Russell Electric Co., 4501 S. Western Blvd., Chicago 9, Ill. These 3,000-r.p.m. motors are in production in ratings of 1/10 and 1/15 hp., and additional ratings of 1/6 and 1/40 hp. will be available.

(240) TELEVISION—Conrac, Inc., 1210 Taft Bldg., Hollywood 28, Calif., has issued a data sheet on its sets. The company offers a chassis for installation in conventional cabinets or in the walls of home or office.

(241) POWER CONTROL EQUIPMENT—Catalog PL 100 gives data on the Taller & Cooper line. It is available from that company at 75 Front St., Brooklyn 1, N.Y.

(242) CABLE — Construction, insulation and other data on high ampere AVC cable are given in a 24-page booklet prepared by Rockbestos Products Corp., New Haven 4, Conn. It contains specification and capacity tables, wiring graphs and a calculator.

(243) F FIXTURES — Commercial, industrial and residential fluorescent fixtures are described in Catalog 949 of Keystone Electric Mfg. Co., 2228-36 E. Tioga St., Philadelphia 34, Pa.

(244) MULTIBREAKERS—Three main classes of multibreakers and their application to small and large homes, farms and small apartments are listed in a pamphlet offered by Cutler-Hammer Inc., 234 N. 12th St., Milwaukee 1, Wis.

(245) TERMINALS — Flexible Products Co., 4945 Colorado Blvd., Denver 16, Colo., offers a data sheet of its line of electrical terminals.

(246) INFRARED—For the small shop and small injection molding machines, Mistello Infra-Red Co. offers the Tumble-Veyor, a portable, combination mixer, dryer and preheater. A data sheet is offered by the company at E. 73rd and Grand Ave., Cleveland 4, Ohio.

(247) D-C GENERATORS—Units larger than 150 kw. or 0.3 kw. per r.p.m. are discussed in Bulletin 0887229 available from Allis-Chalmers Mfg. Co., 939 S. 70th St., Wilwaukee, Wis. Included are two- and three-wire generators and exciters, engine and coupled type.

(248) LAMP BULBS — How miniature lamp bulbs can be used to advantage in household appliances is the subject of leaflet 3-9280 recently released by General Electric Lamp Department, Nela Park, Cleveland, Ohio.

(249) SWITCHES—Outdoor power-fuse disconnecting switches, outdoor power-fuse supports and dropout fuse disconnecting switches are described in recent data sheets of Pacific Electric Mfg. Corp., 5815 3rd St., San Francisco 24, Calif.

(250) CAPACITORS—"How to improve your load voltage without breaking the camel's back," is the title of a booklet in which Cornell-Dubilier Electric Corp., South Plainfield, N. J., discusses its 3-kvar. capacitor. This improved 3-kvar. capacitor is the 240-volt single-phase pole type, housed in a compact case, with improved mounting brackets.

(251) CONNECTORS—Catalog 4-S lists lugs and connectors made by Frankel Conductor Co., 27 Vestry St., New York 13, N. Y.

ELECTRICAL WEST, 68 Post St., San Francisco 4, California
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A new, high quality-level compounded oil recommended for heavy-duty diesel or gasoline engines in normal to difficult service. (Meets U. S. Army Specification 2-104B.)

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RPM DELO LUBRICATING OILS

New and more Efficient Compounding keeps engines cleaner, increases protection, extends overhaul period

ELECTRA'S HUSBAND

DUMB TURKEYS AND A POSSIBLE MORAL

"HOW would you like some turkey for dinner tomorrow night?" Electra asked one evening recently as we were getting ready for bed.

"Not a bad idea," I answered. "It's long enough past Christmas so that it should taste good. But where are you going to get it?"

"Out of the freezer," she said. "Remember that big bird you picked up in the valley before Thanksgiving? Well, we didn't eat half of it so I just put it in a cellophane bag and plunked it in the freezer. The gravy is in a quart carton. The only trouble is that the turkey took up too much room. Next time I'll take a meat saw and cut the carcass in half. That's the trouble with those big broad-breasted birds your friend Jeff Purvis raises."

"Handy device that freezer," I mused. "Without it I would have eaten turkey for ten days. I didn't tell you about Purvis though, when I came back from that trip. He was one of the maddest people you would want to meet."

"Not him," Electra commented. "Why he's a sedate Englishman. What happened?"

"Last winter he built a new brooder house that would handle about 5,000 poults. He wanted to brood indoors in a heated and air-conditioned building so as to get a really early start. When it came to lighting the building, he figured that he would run a continuous row of fluorescent lights the whole length of the place. So he told the electrical contractor who was doing the work what he had in mind.

"This contractor had other ideas. He said something like this to Jeff:

"'Look, mister, you tend to your business and I'll tend to mine. Let me put in a lighting job that will do what it should and that won't cost so much money.'

"Well, Jeff let him go ahead. He installed 500-watt mogul base incandescent lamps in industrial-type reflectors on staggered centers the whole length of the building. It gave plenty of light all right. But about four weeks after Jeff put the first lot of poults in the brooder, he discovered that nearly half of them were blind. The fools stared at those bright light sources so much that their vision was affected."

"Just like a dumb turkey," Electra said. "Of all the creatures the Lord ever created, a baby turkey is the worst."

"That isn't what Jeff thinks," I continued. "He says that electrical contractors achieve that honor. In fact, he doesn't hold a high opinion of anyone in the electrical business. He said to me that if perhaps the turkey-raisers moved in and took over, our industry might do better."

"Oh, he was just beefing about the whole incident," Electra said. "Perhaps he got a bum bunch of baby turks from the hatchery. You know how poults are. They get sick and keel over at the drop of a hat."

"Sure, but they have to get their feet wet first," I said.

"Not always," Electra said. "I remember on the ranch one spring my mother had a terrible time with her baby turks. She used Rhode Island red hens to hatch the eggs. Well, three or four times a day my young brother would come into the house carrying a poult and say to mother, 'Poor turtey, he die.'

"And the turk would be dead all right. Ma would examine it carefully and wonder what disease had struck now. Midway of the second day she had one of us girls watch Freddie. Here's what was happening: He would stand along side one of the coops with a piece of lathe in his hand. When a baby turk stuck its head out of the little square door to take a look around before emerging, Freddie would pop him on the back of the head with his stick. Then he would pick the bird up and start for the house. But my sister beat him to our mother. 'Poor turtey, he die,' he said again. So he got the lathe applied to him, but a little lower down on the anatomy."

After I climbed into bed (what a joy an electric blanket is on a cold winter night) I reflected on what Electra said about turkeys being dumb. Jeff Purvis had told me a story to illustrate this very point. So I passed it along to Electra.

Jeff started in the turkey business on a small scale. He made himself a little electric brooder and bought fifty poults from a hatchery. He sent for a USDA booklet on turkey raising and he purchased the right kind of rations from the feed store in town. His flock was really hand-raised.

Naturally in the course of time they became as tame as kittens. They followed Jeff all over the place when he did his chores night and morning. He had a job in town and worked his initial 25-acre place mornings, nights, Saturdays and Sundays.

Finally they reached an age where it was time for them to start roosting. Jeff built fine roosts back behind a small orchard he had planted. But the dumb turkeys would have no part of them. At sundown they would come to the back door and peep and peep as only young turkeys can.

His wife thought up a solution.

"Why don't you go out where the roosts are and show those poor dumb birds what they are supposed to do.

So Jeff did just that. A little before dark the next evening he led his flock of 47 young turkeys (he'd had a phenomenally low mortality rate for a beginner) out to the roosting place. He climbed up on one of the corner posts and there he sat. Pretty soon some of the turkeys climbed up and settled down. Finally all of them were up. So Jeff jumped down and started for the house. So did every turkey. So back he went and they followed. He stayed put until it was real dark. Then he sneaked into the house.

He went through the same performance the next night. And the next. Then some friends came from town.

"Where's Jeff?" one asked. "Behind the orchard roosting with the turkeys," his wife explained.

"You're kidding," his friend said.

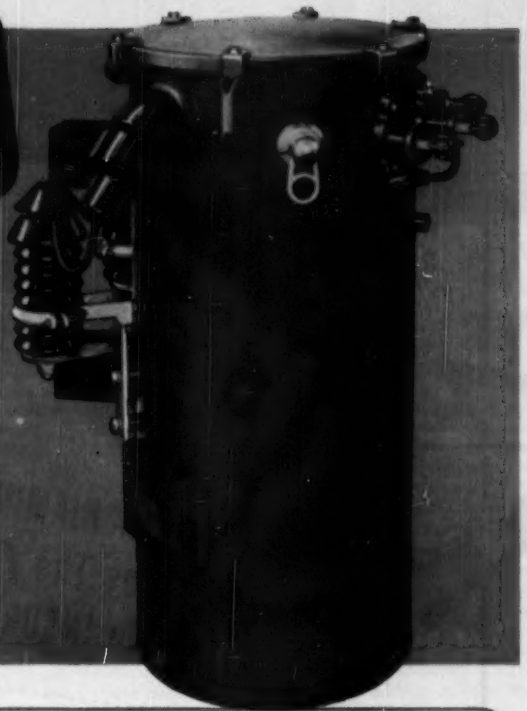
"Go look for yourself," she said.

They did. And there was Jeff perched on one corner of the roost just like the rest of the turkeys. Jeff says to this day he hasn't been able to give a satisfactory explanation.

Electra says there is an applicable moral here for the electrical industry. But darned if I can figure it out.

HERE'S WHAT WE MEAN BY *Premium* PROTECTION

...on ACP* Transformers



1. **CIRCUIT BREAKER** protects against all secondary overloads and short circuits . . . fully utilizes short time overload capacity of transformer.
2. **LIGHTNING ARRESTERS** externally mounted provide overvoltage protection . . . expulsion or valve types.
3. **BREAKER RESET HANDLE** provides safe, easy means of energizing load.
4. **SIGNAL LIGHT** indicates when transformer has entered into the maximum safe operating band . . . stays lit to provide visual check on loading.

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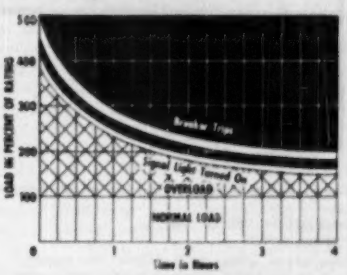
A-2945

How ACP Transformer Utilizes Overload Capacity

Breaker is actuated by either excess load current, oil temperature, or both. Coordination of these elements with thermal characteristics of transformer puts overload capacity to work (see typical curve for ACP transformer at right).



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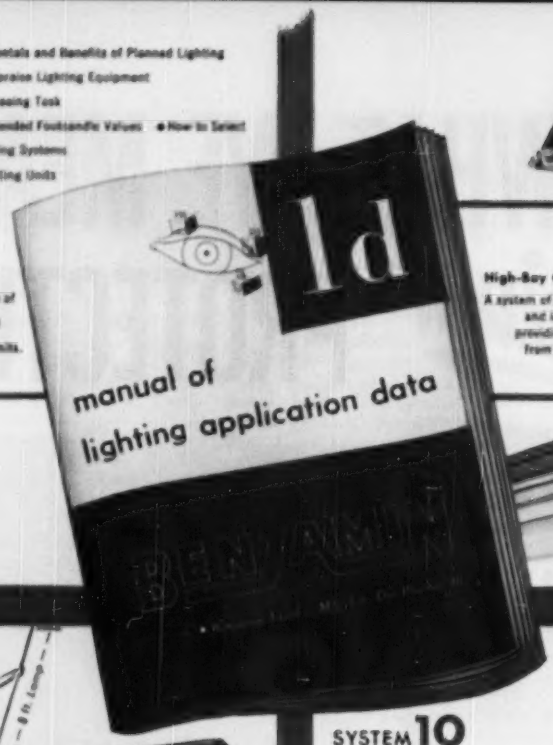


SYSTEM 4

High Narrow-Bay Concentrating Units

Individually spaced incandescent system for providing illumination levels from 20 to 50 footcandles.

SYSTEM 5

High-Bay Combination Units

A system of combination mercury and incandescent units for providing illumination levels from 20 to 50 footcandles.

SYSTEM 7

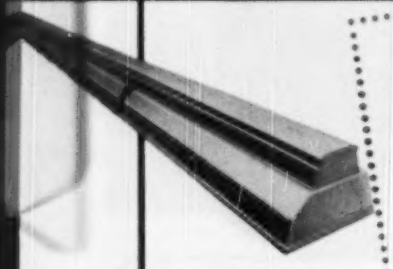
RLM "Shield-Flo 40"

A system of individually spaced, specially shielded, closed-end fluorescent units, providing from 20 to 50 footcandles.

SYSTEM 10

"Magno-Flo 75"

A high light output system of fluorescent units, providing from 40 to 70 footcandles.



SYSTEM 11

"Lite-Line" System

A continuous channel system of fluorescent units, for providing illumination levels from 50 to 100 footcandles.

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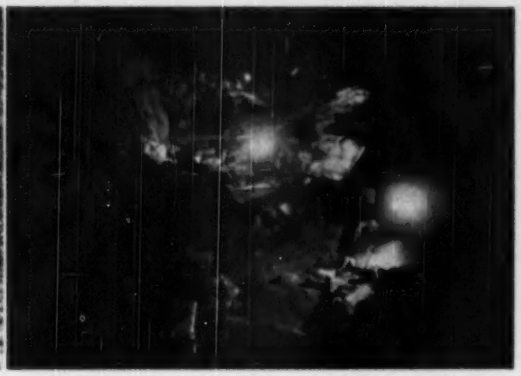
Zone_____ State_____

BENJAMIN
Lighting Equipment
Sold Exclusively through Electrical Distributors

FEBRUARY, 1950 Vol. 104, No. 2

ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.



Pacific Gas and Electric's Strawberry Dam under construction, November 1913 Southern California Edison Co. builds fourth Big Creek plant, November 1949

AT THE TURN OF THE HALF CENTURY

1900 When the 20th century dawned, all of the elements necessary for the development of the electrical industry were present. Fundamental theories had been translated into equipment and technique. The water wheel, the steam turbine, the a-c generator, the transformer and the induction motor were available.

And nowhere in the world was greater progress being made in the application of these machines than in the Far West. This, too, in the face of almost unsurmountable obstacles. High-voltage, long-distance transmission was an accomplished fact (maximum voltage was 30 kv. and 70 kv. was planned). The Pacific Coast Electric Transmission Assn. was two years old. It had 24 member utilities scattered from Seattle to Salt Lake to Santa Monica. Eight separate companies served San Francisco. There were no industry statistics. Not until 1910 was the infant industry sufficiently robust to report its size: 710,000 kw. capacity, and 2 billion kwh. for the whole West.

But it had hopes and aspirations! Witness this editorial prediction from this magazine's predecessor in 1900: "The opportunities for the development of new uses for electrically transmitted power are limitless, and many applications, at present virtually unknown, may be conjured up as idealistic."

1950 Attractions that lured people Westward in 1900 have lost none of their potency. The economy of the Far West is typified by extremely dramatic and continuing growth. In the constant enlargement of the economic base electric power plays an important role. Its abundance and its low price make it a major economic asset in the Far Western region.

The mid-century statistical picture bears out this contention. Today the one-eighth of the U.S. population residing in the eleven Western states uses one-fifth of all of the electric energy generated in the country. And it pays proportionately lower prices for it. The West's 57½ billion kwh. power output in 1949 is more than twenty times the 1910 figure and the 3¼ billion kwh. increase over 1948 was more than a year and a half supply for that earlier era. The 1,000,000 kw. increase in generating capacity, which brought the total for the area to 11,067,517 kw., is 30% greater than the electric power producing capability of 1910. And another million kilowatts will be added to Western systems this year. So long as the Westward migration of population and industry continue, this rate of growth will be maintained. Especially so, since from its very beginnings, the electrical industry has kept ahead of demand.

2000 Predicting the future of an industry that doubles its size every seven to nine years is a precarious chore. Few projections for the electrical industry go beyond 1970 and these only encompass uses for electrical energy that are known today. And today's actual uses are but a fraction of today's potentials. In the home field alone consumption would treble if the public as a whole was to demand the comforts and conveniences that today are only accepted as necessary by a small segment. Therein lies but one challenge to our industry's salesmanship.

When one considers the variety of electrical applications that have contributed to America's standard of living and working which have evolved during the last half century, he might conclude that there can be nothing more that is new. However, the recent applications coming out of wartime electrical developments prove that untold horizons are ahead. One needs but look into the industry's research laboratories for further proof.

Much that has been new in electrical progress had its beginnings here in the West. Many new electrical applications found their initial acceptance here. An inherent pioneering spirit of the Western people accounts for this. Hence we may safely predict that, in any future electrical progress and development, the West will excel.

Table I—Comparison of National to Western Operations for 1948 and 1949

	11 Western States		United States		Per cent West to U.S.	
	1948	1949	1948	1949	1948	1949
Energy generated (millions of kwh.)	54,409,276	57,546,068	282,698,214	290,399,084	19.2	19.8
Energy generated in hydro plants (millions of kwh.)	42,210,494	43,245,036	82,469,742	89,555,673	51.2	48.2
Energy generated in fuel plants (millions of kwh.)	12,198,782	15,501,032	200,228,472	200,843,411	6.1	7.7
Percentage of hydro to total generated	77.7	75.2	29.2	30.8		
Installed generator capacity (kw.)	10,023,265	11,067,517	56,559,838	61,166,285	17.7	18.1
Installed hydro generator capacity (kw.)	6,892,556	7,458,068	15,651,630	16,391,638	43.9	45.5
Installed fuel generator capacity (kw.)	3,130,709	3,609,449	40,908,208	44,774,647	7.7	8.1
Revenue from energy sales (thousands of dollars)	580,589	623,100	4,313,313	4,611,000	13.4	13.5

Source: Federal Power Commission. 1949 estimated on eleven months' operations.

Table II—Ten-Year Generation Record for Western Public Utilities

	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949*
Arizona	1,404,299	1,459,689	2,630,936	3,198,771	3,770,667	3,435,988	2,823,650	2,769,495	3,282,118	3,398,813
California	9,788,869	10,383,352	11,383,154	14,776,371	15,887,456	15,943,740	17,313,659	19,441,429	20,286,893	22,112,915
Colorado	791,967	818,213	977,690	1,097,260	1,136,831	1,128,655	1,168,151	1,375,653	1,592,067	1,618,112
Idaho	1,175,305	1,142,341	1,244,946	1,338,183	1,233,764	1,263,032	1,334,914	1,507,474	1,622,107	1,819,135
Montana	1,769,124	2,177,623	2,248,133	2,597,086	2,459,781	2,318,130	2,465,805	2,764,383	2,869,825	2,887,808
Nevada	2,324,176	2,403,747	2,432,724	3,228,132	3,244,462	2,590,404	2,488,076	2,908,189	3,607,239	3,558,333
New Mexico	316,862	368,499	409,854	470,931	511,165	556,892	604,992	753,897	845,696	909,903
Oregon	1,739,903	2,909,772	3,651,159	4,619,280	4,785,539	4,183,748	4,148,566	5,456,577	5,433,228	5,319,010
Utah	577,641	564,812	604,393	619,280	436,943	416,956	457,169	562,198	600,208	625,341
Washington	3,944,184	4,499,031	6,494,920	8,926,679	10,311,897	9,689,862	9,038,842	11,230,994	12,881,239	14,997,966
Wyoming	484,701	217,343	243,697	290,538	255,575	263,403	315,898	325,684	388,656	501,753

FPC reports. *12 months ending November.

Table III—Number of Utility Customers at End of 1949

Class of Customer	11 Western States			United States		
	1948	1949	Change	1948	1949	Change
Residential	4,472,304	4,709,600	237,296	33,549,396	35,354,500	1,805,104
Rural	456,533	493,500	36,967	1,694,579	1,816,400	121,821
Commercial and industrial	827,652	861,500	33,848	5,335,960	5,515,900	179,940
Municipal, railway and miscellaneous	22,060	23,900	1,840	142,053	149,000	6,947
Total	5,778,549	6,088,500	309,951	40,721,988	42,835,800	2,113,812

Table IV—Type and Capacity of Utility Generators, November 1949

State	Utilities	Plants	Total Capacity Kw.	Generator Capacity in Kw. of Plants Operated by Water Power No.	Water Power Capacity	Steam Power No.	Steam Power Capacity	Int. Comb. Engines No.	Int. Comb. Engines Capacity
Arizona	18	52	725,185	15	540,759	9	126,850	28	57,576
California	21	161	4,711,164	122	2,380,045	27	2,286,169	12	44,950
Colorado	45	88	388,485	30	86,985	23	276,048	35	25,452
Idaho	14	49	356,630	41	351,646	1	400	7	4,584
Montana	14	33	448,771	20	432,638	4	11,968	9	4,165
Nevada	8	16	593,672	10	586,275	-	-	6	7,397
New Mexico	22	46	250,832	6	25,090	13	193,142	27	32,600
Oregon	19	71	907,823	50	709,899	13	190,310	8	7,614
Utah	27	78	179,604	59	93,245	4	68,750	15	17,609
Washington	20	55	2,400,944	40	2,196,736	9	200,820	6	3,388
Wyoming	29	56	104,407	16	54,750	12	40,560	28	9,097
11 Western States	237	705	11,067,517	409	7,458,068	115	3,395,017	181	214,432
United States	1,607	3,910	61,166,285	1,471	16,391,638	1,050	43,043,394	1,389	1,731,253

Source: FPC.

Table V—Number of Customers Jan. 1, 1949

State	Total	Residential or Domestic	Rural (Distinct Rural Rates)	Commercial and Industrial Small	Commercial and Industrial Large	Street & Highway Lighting	Other Public Authorities	Railways and Railroads	Inter-departmental
Arizona	182,305	155,967	809	24,967	210	91	249	-	12
California	3,804,239	2,400,158	387,669	479,814	22,251	2,794	10,892	11	450
Colorado	359,259	281,287	21,919	46,385	8,350	259	1,047	-	12
Idaho	180,194	148,298	7,016	23,994	605	232	48	-	1
Montana	162,709	139,420	-	20,429	2,393	279	86	2	100
Nevada	43,985	34,138	1,675	7,966	86	45	75	-	-
New Mexico	128,090	104,211	4,446	18,522	441	85	385	-	-
Oregon	459,735	384,572	10,310	59,237	3,264	392	1,957	1	2
Utah	186,451	167,372	97	16,983	1,342	368	287	2	-
Washington	701,881	597,676	21,814	77,814	2,827	45	1,265	27	5
Wyoming	69,901	59,205	778	8,402	1,370	60	86	-	-
11 Western States	5,778,549	4,472,304	456,533	784,513	43,139	5,058	16,377	43	582
United States	40,721,988	33,549,396	1,694,579	5,131,730	204,230	30,344	110,779	152	778

Table VI—Farm Electrification by States

State	U. S. Census of Agriculture Total Number of Farms Jan. 1, 1945	Farms Within ½ Mile Distribution Line Number	Farms Within ½ Mile Distribution Line %	EEI Data Dec. 31, 1947 Number	Dec. 31, 1947 %	Dec. 31, 1948 Number	Dec. 31, 1948 %	Dec. 31, 1949 Number	Dec. 31, 1949 %
Arizona	13,142	9,336	71.0	10,900	82.9	11,200	85.2	10,800	82.2
California	138,917	121,734	87.6	120,500	86.7	127,800	92.0	132,400	95.3
Colorado	47,618	25,970	54.5	29,700	62.4	32,900	69.1	38,400	80.6
Idaho	41,498	32,454	78.2	35,400	85.3	38,100	91.8	40,600	97.8
Montana	37,747	12,525	33.2	14,100	37.4	17,100	45.3	21,500	57.0
Nevada	3,429	1,892	55.2	1,700	49.6	1,900	55.4	2,000	58.3
New Mexico	29,695	9,401	31.7	10,400	35.0	12,800	43.1	15,000	50.5
Oregon	63,125	49,560	78.5	56,600	90.0	59,600	94.4	63,300	100.3
Utah	26,322	20,399	77.5	20,400	77.5	21,100	80.2	21,600	82.1
Washington	79,887	69,142	86.5	76,000	95.1	76,800	96.1	80,000	100.1
Wyoming	13,076	5,391	41.2	6,300	48.2	7,200	55.1	8,200	62.7
11 Western States	494,456	357,804	72.4	382,000	77.3	406,500	82.2	433,800	87.7
United States	5,859,169	3,485,489	59.5	3,335,700	56.9	3,817,100	65.1	4,388,200	74.9

1949-50 HIGHLIGHTS

Production Electric energy use in the Far West is gaining at treble the national rate. In 1949 production was 57,746,068,000 kwh., up 6.2% from 1948. The national increase was 2.8%. The West now uses 19.2% of all the electric power produced in the U.S. More than half of the nation's hydroelectric power comes from Western generating plants. Even so, the proportion of power generated by steam is increasing in the West. In 1949 steam plants contributed 25% of the supply. In 1948 this source produced 22.3%, though the region had a serious drouth.

Capacity Utilities serving the eleven Western states had an installed capacity of 11,067,517 kw. at the end of 1949. This is almost one-fifth of the national total. New generation of 1,447,000 kw. was brought in during the past year. This was an increase of 247,000 kw. over the 1948 previous all-time record total. USBR hydro accounted for 504,000 kw. Of the remainder 523,000 kw., or 55%, was in steam stations. For 1950 the new capacity scheduled for completion is 1,149,000 kw., making the third successive year additions have exceeded the million mark.

Expenditures A record amount was spent in 1949 for new facilities to serve Western power customers. New construction for non-federal agencies totaled $422,000,000, up 12.5% from 1948. USBR, Army Engineers and REA contributed an additional total of $285,000,000. Excluding federal funds the money spent was distributed like this: fuel plants, 24.5%; hydro stations, 23.5%; transmission facilities, 11.0%; distribution, 37.0% and general plant, 2.0%. Just to round out the picture an additional $50,328,400 was spent on maintenance.

Budgets There will be little letdown in construction activity in 1950. Utilities—private and municipal—have budgeted $395,000,000 for new facilities. That's only 6.5% less than 1949. Federal agencies have 1950 appropriations totaling $270,000,000. The total of the two items is more than one-fifth of all the money to be spent on power construction in the U. S.

Customers The 6,088,500 customers served by Western electrical utilities at the end of 1949 represent one-sixth of the U.S. total. During the year 309,951 new customers were added of which 237,296 were in the residential classification. This is a drop of almost 50,000 from 1948 indicating that the region is beginning to catch up on its housing backlog. With the exception of three or four states, this region is approaching saturation on its farm electrification job. It has more than 27% of all U.S. electrified farms.

Energy Use Abundant supply and low cost are the two factors contributing to the high energy use per customer in the Far West. Output per customer for this region was 9,660 kwh., as compared to the national figure of 6,950 kwh. Load factor on Western stations is higher also. In 1949 output per kw. was 5,500 kwh. for the West, 5,210 kwh. for the nation.

Construction Figures for California are indicative of the construction trend in this region. In 1949 California led all states in value of new construction with a total of $2,240,000,000—12% of the U.S. total. One out of every six of the nation's private homes was built in California. Volume in this state represents about half of the Western total. Engineering awards for the eleven Western states totaled $2,265,000,000, up 9% from 1948. The construction industry anticipates a boom year in 1950.

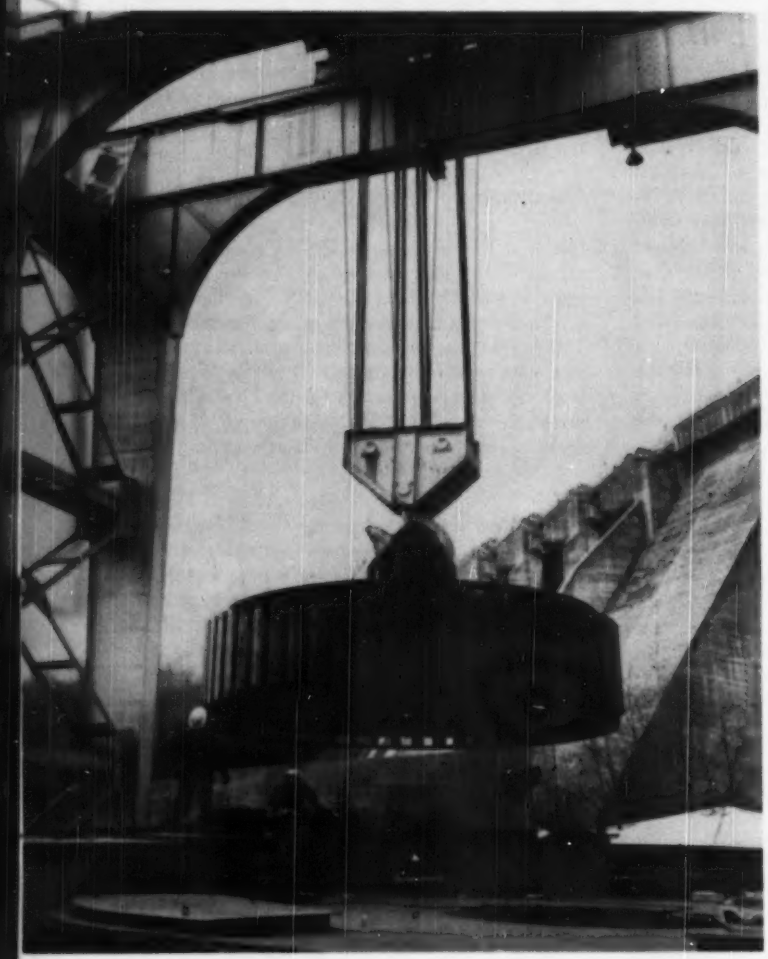
Appliances Not alone the West's population increase, ranging from 3% to 12% in the various states, but low rates and high living standards have kept appliance sales pushing the manufacturers for more allocations throughout 1949, promise to do the same in 1950. High saturations mean strong acceptance and a huge replacement market. Highest kwh. per domestic customer averages in the nation, one of 10,408, several over 6,000, many over 5,000, speak for electric appliance usage.

Promotion With an improved power supply, most of the utilities will get back into load building and sales promotion in 1950, especially on those items that bring a better load factor, are off-peak in character and bring in the kind of revenue that helps keep rates down. Restaffing, sales training, area-wide promotion campaigns, advertising, all will be employed.

Despite curtailment in 1949, Western utilities spent 422 million for new construction—an all-time record. For new construction in 1950, 395 million have been budgeted

'49 A RECORD — '50 CLOSE SECOND

Load growth kept Western utilities spending at rate of 1.15 million dollars a day



Lowering rotor (upper) of Pacific Power & Light Co.'s new Merwin unit. On opposite page from top to bottom are views of one of Bonneville's new 230-kv. lines, unit sub of San Diego Gas & Electric Co., view of PG and E's Moss Landing plant, and a modernized switchyard at a Southern California Edison plant

REMARKABLE records are being made by the utility industry of the West. Figures for 1949 and 1950 compiled by ELECTRICAL WEST amply bear that out.

New Construction for 1949, federal excluded, required an expenditure of $422,000,000—$1,150,000 a day! This was 6.25% less than the $450,000,000 budgeted for 1949, but 12.5% greater than the record expenditure of $375,000,000 for 1948.

Outlook for 1950 is a sustained high level of spending for betterments. The $395,000,000 budgeted for 1950 by Western systems, exclusive of federal agencies, is down only 6.5% from the 1949 actual expenditures of $422,000,000 mentioned.

Federal Agencies, exclusive of REA, all have stepped-up construction programs for 1950. USBR has $117,000,000 in funds available for power projects in the West for the fiscal year—up 70% over 1949. Bonneville Power Administration has $40,000,000 to spend—an increase of 17.5% over '49. Army Engineers have appropriations of $35,000,000 for McNary and $5,000,000 for the Chief Joseph project. Active construction is under way on the $70,000,000 Detroit Dam project involving a power development of 118,000 kw., scheduled for 1953 completion.

Peak total for 1949 computed for Western systems was exactly 10,000,000 kw. Included in this is 15% of Bonneville Power Administration's peak of 2,085,000 kw. The 85% of BPA peak excluded was conservatively assumed to have been included in the peak figures separately reported by public and private agencies of the Northwest purchasing Bonneville power. This 10,000,000-kw. demand represents an increase of 700,000 kw., or 7.5% over the 1948 peak calculated on the same 15/85 basis. Bonneville's peak was up 22.2% over the 1948 peak of 1,703,000 kw.

New Generation of 1,447,000 kw.

was brought in by all agencies of the West during 1949 to meet this nearly three-fourths of a million kilowatt increase in load, and to build up reserves. Of new capacity, USBR contributed 504,000 kw. in hydro. Of the remaining 943,000 kw. installed by other than federal agencies, 523,000 kw., or 55%, was steam. Total new generation for 1948 was 1,120,700 kw. by comparison with the 1,447,000 kw. for 1949. Scheduled for 1950 is another 1,149,000 kw. Of this, 444,100 kw. is USBR. The remainder of 705,500 kw. by privates and municipals will consist of 383,500 kw. in steam, or 54%. See the Calendar of New Generation on page 70 for the complete story on new plant capacity installed and planned up to and including 1955.

New Transmission above 57 kv. totaled 2,916 miles for 1949. For 1950, 3,406 miles are planned. Most of this will be 110-kv. and 230-kv. construction.

Distribution Line Mileage in 1949 amounted to 7,647 miles. In 1950, 6,000 miles are planned.

Substation Transformer Capacity added in 1949 to transmission substations reached the surprising total of 2,800,000 kva. Only slightly less is the 2,417,000 kva. scheduled for 1950.

Distribution Substation Transformer Capacity added in 1949 was 1,665,000 kva. For 1950, 1,400,000 kva. is proposed.

Read each report of the individual agencies in the pages that follow, the better to be informed how the utility industry of the West, exclusive of federal agencies, will spend more than a million dollars a day for new facilities. Include federal agencies, Public Utility Districts, REAs and Co-ops, and close to another million dollars a day will be spent. That's two million dollars a day!

Federal

Army Engineers

Projects of the U. S. Army Engineers will be found listed under the states of Oregon and Washington.

Bonneville

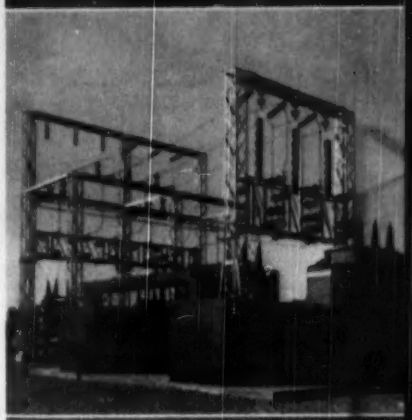
Report of the Bonneville Power Administration is on page 71.

Bureau of Reclamation

Reports on status of Western USBR projects will be found listed under the states in which they are located. A table will be found on page 63 showing current and future bureau power projects. The comprehensive transmission line construction program of USBR will be found on page 62. The past year was one of great activity for this federal agency. During 1949 fiscal year, $68,900,000 were spent on power projects of the bureau in the West. Funds available for the 1950 fiscal year are $117,500,000. During the past year new hydro generating capacity amounting to 504,000 kw. was brought in. Miles of transmission above 57 kv. amounted to 1,097. Distribution mileage was 71.5 miles. Substation transformer capacity was increased by 102,100 kva., exclusive of 607,900 kva. in step-up transformers at power plants. New hydro capacity scheduled for 1950 amounts to 444,100 kw. Transmission above 57 kv. will be 869 miles and distribution, 65 miles. Substation transformer capacity will be increased by 167,100 kva., exclusive of 532,900 kva. for power plant step-up transformers.

REA

REA had an active year. Detailed information on number of borrowers, miles of line and other pertinent data will be found in the tables on pages 56 and 57.



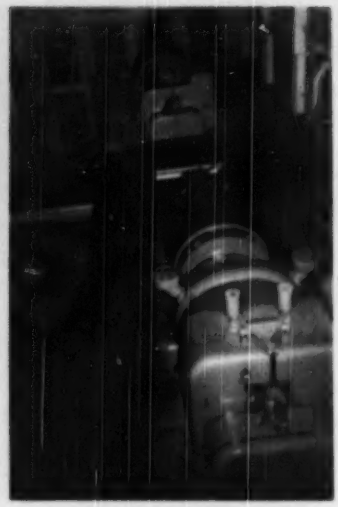
Arizona

Boulder Canyon Project, USBR

Generators for Units A-3 and A-4 for the Hoover power plant are currently under contract. These 82,500-kva. generating units, scheduled to be placed in operation by the summer of 1951, will complete the installation in the Arizona wing of the power plant. A contract for manufacture and installation of the 62,500-kva. generator A-9 was awarded in August. Invitations are expected to be issued in June for installation of turbines, transformers, and accessory equipment for generators A-3, A-4, and A-9.

Central Arizona, L&P

Expenditures for new electrical facilities during 1949 amounted to approximately $7,700,000. Included in this amount is an expenditure of approximately $1,600,000 to complete installation of the 11.5-megawatt steam generating unit at the company's steam electric station west of Phoenix; and the expenditure of $3,100,000 for the installation of a 60/66-megawatt Westinghouse turbogenerator unit which will be completed in May 1950 at a total project cost of $7,750,000. Com-



New plant of Tucson GEL&P Co.

pletion of the 1950 installation will bring steam generating capacity to 150 megawatts. In addition to its own steam generation, the company purchases hydro energy from the Parker project of the U. S. Bureau of Reclamation and the Salt River Valley Water Users Assn.'s hydro projects.

The system peak load reached a new high of approximately 133 megawatts which represents a 11% growth over the 1948 peak. Customers added during the year were less than estimated amounting to only 3,600 for a total of 65,600 customers. The kilowatt-hour sales increased 45,000,000 over the previous 12 months. The 69-kv. transmission system was expanded by adding approximately 60 miles, and distribution line mileage increased approximately 150 miles. A total of 45,000 kva. of capacity was added to transmission and distribution substations and distribution transformers added exceeded 18,000-kva. capacity. To improve voltage and power factor conditions 5,400 kva. of capacitors were added to the system. It has been the policy of the company for the past several years to take the load growth on the 12-kv. distribution system by cutting the 4-kv. system to 12 kv. This program is now completed, leaving only the downtown areas on the old 4-kv. system.

The company again increased its service area, this time in the northeast part of the state by the creation of the White Mountain Division by leasing the electrical facilities in the communities of Woodruff, Snowflake, Taylor, Shumway and Showlow. Service was improved by the building of a main trunk line between Showlow and Snowflake and service extended to the Petrified Forest and the area of Hay Hollow.

All the transmission and distribution facilities of the Arizona Power Co. were purchased in October 1949, and will be operated as a wholly owned subsidiary of Central Arizona Light and Power Co. under the name of Northern Arizona Light & Power Co. Production facilities are under 30-year lease to Northern Arizona Light & Power Co.

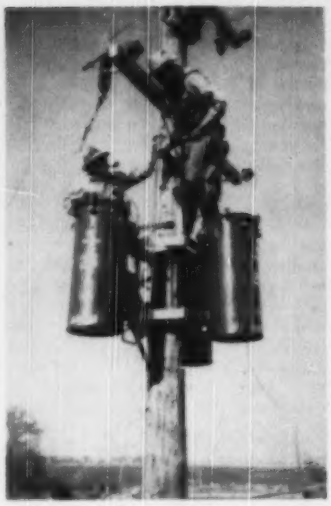
The 1950 construction budget calls for an expenditure of approximately $6,470,000, of which $4,650,000 are for additional generating facilities; $300,000 for transmission and $1,300,000 for distribution facilities. Approximately 20 miles of 69-kv. transmission lines and 130 miles of distribution lines, 80,500 kva. of transformer capacity in transmission and distribution substations are planned; 15,000 kva. of distribution transformer capacity are planned to be added to the system this year. This is the smallest budget in the last few years due to the building activity slacking off from that of the past few years.

FM radio communication has proved such a boon to operations that it is planned to increase the mobile units from 40 to 60. The main dispatching office is being moved from the steam plant to the downtown Phoenix office. *—George H. Groh, vice-president in charge of operations.*

Davis Dam Project, USBR

Davis Dam power house structure is to be completed early in 1950, and the first of the five 45,000-kw. hydroelectric generating units is to be installed and placed in operation by the fall of 1950. Through interconnection with the Hoover and Parker power plants, Davis power will supply pumping plants on the Gila project in southwestern Arizona and power markets in central and southern Arizona, southern Nevada, and southern California.

The Davis - Prescott - Mesa-Coolidge 230-kv. transmission line is to be substantially completed this year, and the Davis-Hoover and Davis-Parker 230-kv. lines and the Parker-Gila 161-kv. line are expected to be placed in service in October. Contract for construction of the 115-kv. Tucson-Cochise line was awarded last August. Invitations for construction of about 21 miles of the 34.5-kv. Wellton-Mohawk power supply transmission line and stringing conductor for the 230-kv., 280-mile-long Davis Dam-Mesa line are expected to be issued by early spring. A contract for construction of transmission line foundations and towers for the



Transformer hanging, Salt River Project

230-kv. Mesa-Coolidge line was awarded in July and a contract for installation of the conductor and overhead ground wires, Davis-Hoover and Davis-Parker lines was awarded in September. Construction on the Coolidge-Electric District No. 5, 115-kv. line is about 10% completed.

Substations under construction include the 15,000-kva. substation at Blythe, Calif., construction of which began in July, and the 34.5-kv. substation at Yuma, Ariz., construction of which is about 25% completed. Bids have recently been invited for construction of the 132,000-kv. Coolidge and 60,000-kva. Mesa substations. Invitations are expected to be issued by early spring for construction of the 30,000-kva. Prescott, 45,000 kva. Tucson, 20,000-kva. Cochise, and 15,000-kva. ED-2 and ED-4 substations.

Salt River Project

Expenditures during 1949 for new and improved facilities by the power district of the Salt River project amounted to approximately $2,413,000. The largest single expenditure was for the new 60-cycle, 7,500-kw. generator, placed in operation at the steam plant on May 24. In order to facilitate communications between the office and the field, a radio station was constructed in March atop Tempe Butte, Tempe, Ariz. Inaccessibility of the terrain near the summit of the butte presented a major construction problem which was solved by the use of gunite as the building material. A 420-cu. ft. compressor lifted the

Davis Dam plant on the Colorado River will have five 45,000-kw. units. It will be completed by the USBR in 1950

gunite approximately 200 ft. through a 600-ft. hose from the mixing machine to the station site. From this point, which is approximately in the center of the Salt River project, the 250-watt transmitter can reach all points in the project. Under ideal conditions, radio communication is possible over most of the area along the Salt and Verde River dam system. At the present time, 60 cars and five portable stations are equipped with two-way radios.

On May 2, the companion Salt River Valley Water Users' Assn., in conjunction with the city of Phoenix, began construction of new spillway gates at Horseshoe Dam. This dam, located approximately 50 miles northeast of Phoenix, provides irrigation water storage and flood control facilities on the Verde River. The new gates, scheduled for completion in March 1950, will increase the storage capacity of Horseshoe Dam from the present 67,900 acre-ft. to approximately 144,000 acre-ft.

The new well drilling program, which had been in progress since October 1948, was completed in November of 1949. Under this program, necessitated by the lack of sufficient surface water for irrigation purposes and a receding groundwater table, 47 new wells, varying in depths from 120 to 1,000 ft. and capacities from 1,000 to 5,000 gal. per minute, were added to the irrigation system. The pumps, ranging from 50 to 250 hp., are electrically driven, and add 7,945 hp. to the association's connected pumping load.

Added transformer capacity during the year amounted to 45,666 kva. transmission and 20,822 kva. distribution. This increase was due, in a large measure, to the frequency change-over program from 25 to 60 cycles currently in progress. New transmission lines, 57 kv. and above, amount to 39 line-miles, and new distribution lines to about 89 miles. Approximately 3,000 meters were added during the year.

The amount budgeted for 1950 is $2,061,000. Among the new and improved facilities will be several new substations, 33 miles of transmission lines, 50 miles of distribution lines, addition of 36,655 kva. transmission transformer capacity, 11,660 kva. distribution transformer capacity, and approximately 2,000 new meters.—*T. M. Morong, chief engineer.*

Tucson GEL & P

Expenditures for betterments by the Tucson Gas, Electric Light & Power Co. during 1949 amounted to approximately $4,400,000. The amount budgeted for 1950 is $1,282,615. The larger amount for last year was due largely to a 24,000-kw. addition to the company's steam-electric generating capacity. Other important items in the 1949 program included 80 miles of distribution line and the addition of more than 10,000 kva. in substation transformer capacity. System peak for 1948 was 38,200 kw.; for 1949, 43,000 kw., an increase of 12.6%.

Included in the 1950 program will be the addition of 5,000 kva. in substation transformer capacity, 9,000 kva. in distribution transformer capacity and the building of about 50 miles of distribution line.

California

Anaheim L&W Dept.

During the year 1949 the electric department of the City of Anaheim spent $113,300 for new facilities, and for 1950 an amount of $40,000 is budgeted. Major item in last year's program was the addition of a 3,000-kva. unit-type substation. System peak for 1948 was 4,416 kw. and for 1949, 5,568 kw., an increase of 26%.

Outlook for 1950 is the possibility that several subdivisions will be opened in Anaheim. Load building in existing homes will necessitate installing larger transformers and stringing larger primary and secondary circuits. A second 12-kv. line to serve the new 3,000-kva. substation put into service during 1949 may be built in 1950.—*V. W. Hannum, superintendent.*

Burbank PS Dept.

Capital expenditure for 1949 totaled $2,350,000. Capital expenditures of approximately $1,000,000 are planned for 1950. Several large projects are scheduled for the near future, but will only reach the final stages of engineering and preparation of specifications this year.

The major project completed in 1949 was a 20,000-kw. addition to the steam-electric generating plant. This is the third unit at the plant, increasing its capacity of 40-000 kw. the new unit was placed in regular service Nov. 1, 1949, and preliminary tests show an output of 532 kwh. per barrel of

fuel oil at full load. Pressure and temperature of the new unit are 825 psi. and 900°F., as compared with 625 psi. and 825°F. for the 10,000-kw. units 1 and 2.

System capacity at this time consists of 40,000 kw. of steam generation plus 5,100 kw. of Hoover Dam power, but in meeting present peak loads of 43,000 kw., there are no reserves for stand-by or for system growth which is running 15% above last year. Power interchange contracts with two adjacent municipal electric systems are relied upon to make up this deficiency until another 20,000-kw. unit can be installed. Engineering and the preparation of specifications for this unit have been started. Switching facilities, auxiliary power transformers, and common station facilities for unit 4 were incorporated in the design and construction of unit 3. Estimated cost for unit 4 is approximately $2,500,000.

Distribution feeder capacity is rapidly being absorbed and, although a new distributing station with an installed transformer capacity of 20,000 kva. was placed in service in May 1948, another of similar capacity is now required. The new station will be in an R-3 (apartment buildings) zone, and some difficulty is being experienced in designing a station structure which will be architecturally satisfactory.

Supervisory Control

Specifications are being written for a supervisory control system to cover three unattended distributing stations, and three unattended industrial substations. These stations, including the proposed new distribution station, have an aggregate transformer capacity of 76,000 kva. Nine sections of 34.5-kv. line, comprising the three-legged system to which these stations are connected, also will be included in the supervisory control system.

In June 1949, the engineering, accounting and administrative sections moved into the newly completed office building. The building is a two-story and basement, reinforced concrete structure providing 30,000 sq. ft. of office space. Pole line extensions this year totaled four miles of distribution and another five miles of overhead street lighting. A net increase of 3,225 kva. of pole line transformer capacity was made. Overhead construction forces will be nearly doubled in an effort to reduce a heavy backlog of pole line replacements. There are approximately 40 pole-line miles of distribution lines in residential areas which are in urgent need of replacement.—*James H. McCambridge, general manager.*

Status of Western REA-Financed Systems

System	Cumulative Construction Loans 12-31-49	1949 Construction Loans	Miles Energ. 12-1-49	Consumers Connected 12-1-49
ARIZONA	**$14,645,786**	**$3,835,000**	**1,676†**	**7,604†**
Navopache Elec. Co-op., Lakeside	2,538,000	.....	311†	1,730†
Sulphur Springs Valley Elec. Co-op., Willcox	4,088,000	1,910,000	588	2,492
Littlefield Elec. Co-op., Littlefield	20,000	.....	1†	12†
Graham County Elec. Co-op., Pima	3,050,500	895,000	263	1,700
Ma-Ha Elec. Co-op., Buckeye	532,232	.....	*	*
Trico Elec. Co-op., Tucson	2,549,768	790,000	139†	107†
Verde Elec. Co-op., Cottonwood	325,000	.....	100†	254†
Mohave Elec. Co-op., Kingman	550,000	240,000	18	145
Duncan Valley Elec. Co-op., Duncan	750,000	.....	23	636
Stonewall Elec. Co., Tucson	100,000‡	.....	116†	200†
San Carlos Irrig. & Drainage Dist., Coolidge	142,286‡	.....	117†	331†
CALIFORNIA	**$ 6,837,178**	**$ 388,000**	**2,132†**	**10,811†**
Imperial Irrig. Dist., Imperial	700,000	.....	700†	4,000†
Surprise Valley Electrif. Corp., Alturas	2,061,500	68,000	731	1,649
Plumas-Sierra Rural Elec. Co-op., Portola	1,147,000	320,000	408	980
Mountain Empire Rural Elec. Co-op., Campo	417,000	.....	190	956
Sacramento MUD, Sacramento	1,400,000	.....	100†	3,146†
Mass Elec. Co-op., Phelan	67,829‡	.....	*	*
Klamath River Elec. Co-op., Hornbrook	43,849‡	.....	31	80†
COLORADO	**$33,773,528**	**$5,152,000**	**13,990†**	**40,657†**
Grand Valley Rural Power Lines, Grand Junction	379,000	.....	524	2,456
San Luis Valley Rural Elec. Co-op., Monte Vista	1,684,000	235,000	895	2,150
Morgan County Rural Elec. Assn., Fort Morgan	1,726,000	96,000	805	1,870
Intermountain Rural Elec. Assn., Littleton	2,344,000	25,000	2,509	4,212
Southeast Colorado Power Assn., La Junta	2,925,810	655,000	1,550	3,870
Gunnison County Elec. Assn., Crested Butte	335,000	.....	160	563
Delta Montrose Rural Power Lines Assn., Delta	1,294,000	460,000	662†	2,016†
Union Rural Elec. Assn., Brighton	1,802,000	57,000	774	2,066
San Isabel Elec. Assn., Pueblo	1,070,000	580,000	376	1,071
San Miguel Power Assn., Nucla	721,000	470,000	212	794
Highline Elec. Assn., Holyoke	2,246,477	.....	1,450	2,797
Poudre Valley Rural Elec. Assn., Fort Collins	1,286,000	.....	901	2,587
La Plata Elec. Assn., Durango	1,060,000	.....	395	1,499
Empire Elec. Assn., Cortez	1,593,000	340,000	492	3,007
Holy Cross Elec. Assn., Glenwood Springs	730,000	.....	259†	1,017†
Sangre De Cristo Elec. Assn., Salida	1,222,000	805,000	319†	777†
Yampa Valley Elec. Assn., Steamboat Springs	996,000	.....	425†	902†
Mountain View Elec. Assn., Limon	2,917,000	192,000	1,659	2,755
Y-W Elec. Assn., Akron	2,525,000	1,567,000	301	1,330
K.C. Elec. Assn., Hugo	3,575,000	.....	167†	1,804
White River Elec. Assn., Meeker	838,500	170,000	131†	719†
Monument Elec. Co., Trinidad	103,741	.....	74†	396†
IDAHO	**$ 8,825,000**	**$ 160,000**	**4,844†**	**11,858†**
Northern Idaho R. Elec. Rehab. Assn., Sandpoint	1,629,750	.....	831	2,190
Clearwater Valley L. & P. Assn., Lewiston	3,023,000	.....	1,579	3,685
Kootenai Rural Elec. Assn., Coeur D'Alene	1,061,000	.....	648	1,956
Idaho County L. & P. Co-op. Assn., Grangeville	893,500	160,000	498	914
Raft River Rural Elec. Co-op., Malta	406,000	.....	225	366
Fall River Rural Elec. Co-op., Ashton	1,075,000	.....	520	1,370
Lost River Elec. Co-op., Mackay	379,000	.....	213†	785†
Prairie Power Co-op., Fairfield	162,000	.....	165	172
Long Valley Power Co-op., Donnelly	196,045‡	.....	165†	420†
MONTANA	**$27,907,298**	**$3,998,000**	**13,200†**	**24,873†**
Ravalli County Elec. Co-op., Corvallis	476,700	.....	316	797
Sun River Elec. Co-op., Fairfield	1,884,500	274,000	1,473	2,062
Lower Yellowstone Rural Elec. Assn., Sidney	1,131,600	120,000	327†	824
Yellowstone Valley Elec. Co-op., Huntley	1,288,498	240,000	721†	2,012
Vigilante Elec. Co-op., Dillon	1,733,000	278,000	880	1,566
Missoula Elec. Co-op., Missoula	945,000	.....	377	719
Flathead Elec. Co-op., Kalispell	1,040,000	.....	427	1,492
Fergus Elec. Co-op., Lewistown	2,283,000	330,000	1,431	1,963
Park Elec. Co-op., Livingston	900,000	.....	532	1,051
Mid-Yellowstone Elec. Co-op., Hysham	560,000	175,000	276	585
Beartooth Elec. Co-op., Red Lodge	1,292,000	130,000	851	1,480
Big Horn County Elec. Co-op., Lodge Grass	1,002,000	.....	589	1,068
Big Flat Elec. Co-op., Turner	469,000	.....	337	404
Sheridan County Elec. Co-op., Medicine Lake	2,305,000	630,000	665	934
Northern Elec. Co-op., Opheim	1,355,800	.....	427	500
Valley County Elec. Co-op., Glasgow	835,000	165,000	405	558
McCone County Elec. Co-op., Circle	1,016,000	230,000	403	935
Goldenwest Elec. Co-op., Wibaux	989,000	.....	617	624
Glacier County Elec. Co-op., Cut Bank	881,000	.....	246	2,167
Marias River Elec. Co-op., Shelby	1,655,000	100,000	620	1,872
Hill County Elec. Co-op., Havre	2,450,000	675,000	1,278	976
Tongue River Elec. Co-op., Terry	391,000	126,000	*	*
Southeast Elec. Co-op., Ekalaka	500,000	.....	2†	284†
Elmo Elec. Co-op. Assn., Polson	110,000	110,000	*	*
Lincoln Elec. Co-op., Eureka	415,000	415,000	*	*
NEVADA	**$ 316,000**	**$ 30,000**	**166**	**708**
Alamo Power Dist. No. 3, Alamo	99,000	30,000	35	87
Overton Power Dist. No. 5, Overton	217,000	.....	129	621

System	Cumulative Construction Loans 12-31-49	1949 Construction Loans	Miles Energ. 12-1-49	Consumers Connected 12-1-49
NEW MEXICO	**$25,630,800**	**$13,484,000**	**6,334†**	**21,055**
Central Valley Elec. Co-op., Artesia	1,951,000	865,000	434	1,359
Roosevelt County Elec. Co-op., Portales	1,812,000	430,000	920	2,138
Farmers' Elec. Co-op., Clovis	3,180,000	1,525,000	1,508	2,513
Kit Carson Elec. Co-op., Taos	2,175,000	940,000	454	2,773
Otero County Elec. Co-op., Cloudcroft	1,116,000	.....	361	1,194
Stonewall Elec. Co., Albuquerque	224,500	.....	338†	820†
Mora-San Miguel Elec. Co-op., Mora	828,000	.....	497	1,062
Sierra Elec. Co-op., Hot Springs	410,000	125,000	163†	314
Springer Elec. Co-op., Springer	922,000	.....	645	657
The Socorro Elec. Co-op., Socorro	678,000	.....	201	1,566
Central New Mexico Elec. Co-op., Corona	1,267,500	560,000	400	706
Continental Divide Elec. Co-op., Grants	2,625,000	2,275,000	115†	1,282
Lea County Elec. Co-op., Lovington	2,904,000	2,129,000	128	1,484
Columbus Elec. Co-op., Columbus	300,000	.....	119	119
Southwestern Elec. Co-op., Clayton	550,000	.....	*	*
Northern Rio Arriba Elec. Co-op., Chama	710,000	710,000	40†	370†
Jemez Mountains Elec. Co-op., San Ysidro	3,975,000	3,975,000	211†	2,682†
OREGON	**$21,251,904**	**$6,046,000**	**5,791**	**20,469**
Blachly-Lane County Co-op. Elec. Assn., Blachly	822,000	300,000	204	930
Benton-Lincoln Elec. Co-op., Corvallis	3,355,000	925,000	1,278	3,751
Umatilla Elec. Co-op. Assn., Hermiston	513,000	.....	353	1,263
Douglas Elec. Co-op., Roseburg	1,949,500	270,000	556	2,428
Lane County Elec. Co-op., Eugene	1,869,100	250,000	552	3,520
Coos Elec. Co-op., Coquille	2,669,000	1,165,000	472	2,463
Northeast Clackamas County Elec. Co-op., Sandy	714,000	.....	158	501
Tillamook PUD, Tillamook	300,000	.....	62	196
Central Elec. Co-op., Redmond	1,776,000	540,000	467	1,315
Wasco Elec. Co-op., The Dalles	1,931,000	216,000	872	1,234
Columbia Basin Elec. Co-op., Heppner	860,000	.....	80†	80†
West Oregon Elec. Co-op., Vernonia	1,199,000	.....	348	2,021
Eastern Oregon Elec. Co-op. Assn., Pendleton	465,000	150,000	20†	54
Columbia Power Co-op. Assn., Long Creek	2,230,000	2,230,000	*	*
Malheur Co-op. Elec. Assn., Vale	571,720‡	.....	365†	621†
Jordan Valley Elec. Co-op., Jordan Valley	27,584‡	.....	4†	9††
UTAH	**$11,784,000**	**$3,417,000**	**1,218**	**3,318**
Garkane Power Assn., Richfield	1,179,000	208,000	455	1,511
Moon Lake Elec. Assn., Mt. Emmons	1,036,000	.....	588	1,546
Beaver Valley Elec. Assn., Beaver City	24,000	.....	13†	45†
Escalante Valley Elec. Assn., Beryl	825,000	586,000	100†	133†
Flowell Elec. Assn., Fillmore	34,000	.....	28†	47†
Dixie Rural Elec. Assn., St. George	501,080	438,000	34†	36†
Utah-Ariz. Elec. Assn., Kanab	300,000	300,000	*	*
Southwest Utah Power Fed., Cedar City	7,885,000	7,885,000	*	*
WASHINGTON	**$23,777,891**	**$4,302,000**	**10,221†**	**23,913†**
Benton Rural Elec. Assn., Prosser	2,394,500	375,000	849	2,146
Orcas P. & L. Co., Eastsound	1,277,000	155,000	193	1,197
Mutual P. & L. Assn., North Bend	37,919	.....	18†	59†
PUD No. 1 of Klickitat County, Goldendale	2,045,000	.....	518	1,293
Inland Empire Rural Elec., Spokane	3,298,280	.....	2,826	5,514
Columbia County Rural Elec. Assn., Dayton	1,062,000	101,000	681	912
Quinault Light Co., Quinault	125,000	.....	25†	237†
PUD No. 1, Chehalis	659,000‡	.....	330†	1,817†
PUD No. 1 of Kittitas County, Ellensburg	246,000	.....	193†	424†
Stevens County Elec. Co-op., Colville	2,118,000	370,000	738	1,931
Chelan County Elec. Co-op., Leavenworth	231,000	125,000	65	234
Okanogan County Elec. Co-op., Winthrop	225,000	55,000	125	465
Pend Oreille Elec. Co-op., Newport	961,000	.....	466	920
Big Bend Elec. Co-op., Ritzville	1,607,000	465,000	895	856
Lincoln Elec. Co-op., Davenport	1,507,000	168,000	1,096	1,043
Nespelem Valley Elec. Co-op., Nespelem	521,000	170,000	102	515
PUD No. 1 of Clallam County, Sequim	621,000	.....	40	583
PUD No. 2 of Grant County, Ephrata	359,000‡	.....	24†	743†
Ferry County PUD No. 1, Republic	710,000	.....	252	723
PUD No. 1 of Douglas County, Bridgeport	3,172,000	2,318,000	495	974
Mason County PUD No. 1, Shelton	170,000	.....	46†	149†
Pend Oreille County PUD No. 1, Newport	230,000‡	.....	59†	498†
PUD No. 1 of Cowlitz County, Longview	201,192‡	.....	185†	680†
WYOMING	**$15,540,600**	**$5,128,000**	**6,161**	**11,539**
Riverton Valley Elec. Assn., Riverton	731,000	207,000	474	960
Big Horn Rural Elec. Co., Basin	1,013,000	375,000	490	1,196
Wyrulec Co., Lingle	1,739,600	585,000	806	1,611
Bridger Valley Elec. Assn., Mountain View	423,946	.....	190	508
Wheatland Rural Electrif. Assn., Wheatland	601,000	131,000	461†	744
Lower Valley P. & L., Freedom	1,314,500	715,000	255	1,143
Garland L. & P. Co., Powell	195,300	.....	131	359
Washakie Rural Elec. Co., Worland	108,500	52,000	93†	224†
Rural Elec. Co., Pine Bluffs	2,584,000	.....	1,600†	2,078†
Hot Springs County Rural Elec. Assn., Thermopolis	690,000	325,000	238	439
Carbon P. & L., Saratoga	902,054	.....	501	1,028
Niobrara Elec. Assn., Lusk	1,151,000	730,000	*	*
Shoshone River Power, Cody	415,000	.....	240	290
Sheridan-Johnson Rural Elec. Assn., Sheridan	1,100,000	670,000	176†	165†
Tri-County Rural Elec. Assn., Sundance	2,493,000	1,338,000	341	566
Sheridan Suburban Elec. Co., Sheridan	78,700‡	.....	165†	228†

* Not Energized † Estimate ‡ Loan Repaid

California Electric Power

During 1949 $4,288,700 was spent for new facilities by the California Electric Power Co. Budgeted for 1950 is $4,881,100. Construction work authorized and undertaken during the year 1949 included the following items of special mention: Studies are underway in connection with the future construction of a 60,000-kw. fuel-electric generating plant. Construction work at existing hydroelectric plants during the year included rewinding two generators at one plant; installation of automatic shut-off valve in the flowline and modernization of governor equipment at another plant; and the replacement of 2,900 ft. of wood-stave pipe line and expansion of the remote control features at another plant.

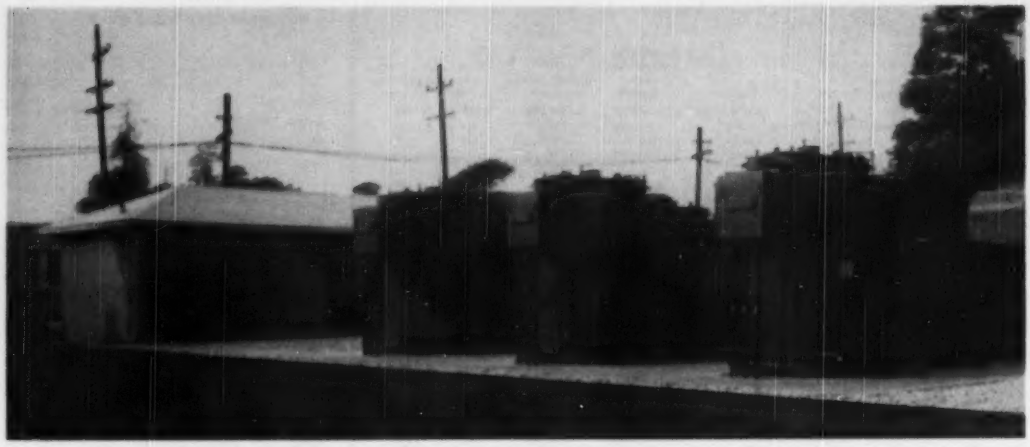
During the year a 15-mile section of 66-kv. transmission supply line was placed in service. Continued work was done in repoling on important transmission lines. In the case of two transmission lines crossing areas difficult of access during extreme storm conditions certain strengthening of the lines was carried out, including addition of guys and installation of heavier guy rods and anchors.

Extensive reconstruction work is also in progress at two transmission substations. At one station wood construction is being replaced with fabricated steel construction. Work at the other includes installation of larger power transformers and provision for future conversion of the 33-kv. section of the station to double-bus, double-breaker operation. Increased transformer capacity was also provided at two other substations. Additional capacity added totaled 49,340 kva. Authorization has been given for converting one station from an unattended to a supervised and carrier controlled station from the central dispatching station.

Considerable work was carried out at principal distribution stations. Work consisted of modernization of oil circuit breakers by the addition of autoreclosing features and installation of arc-quenchers. Voltage regulator capacity was increased at several important substations serving rural and urban areas. New 33-kv. substations were added in areas heretofore served from long primary distribution lines.

Approximately 100 miles of primary distribution lines were converted to 12-kv. operation, in addition to the construction of 25 miles of new 12-kv. lines. Twelve miles of 33-kv. line were also added.

The generating plants budget (9%) includes rebuilding one hydroelectric generator, improvements to and recon-



Duplex unit 34.5-kv. distribution substation with three 2,000-kva. transformers, Glendale Public Service Department

struction of facilities for handling and storage of water at reservoirs and pipelines, and continuance of study started in 1949 in connection with the construction of a 60,000-kw. fuel-electric plant. In addition to the continuing program of repoling and reguying, the transmission budget (5%) includes the reconstruction and rerouting of a section of 100-kv. line. The new section of line will be 5½ miles in length, somewhat shorter than the old section of line. Facilities are scheduled for installation at Victor substation to permit supervisory control of switches at Gale substation on one of the main transmission lines. Provision is also made for expansion of the radio coverage for a double-circuit, 100-kv. line.

The appropriation set up for the distribution budget (73%) is predominately for expansion, increasing capacity of and reconstruction of distribution lines and substations on a system-wide basis. Approximately 30 miles of 33-kv. lines are scheduled for construction in addition to extensive cut-over of existing primary lines to 4 kv., 4.8 kv., 12 kv. or 33 kv., according to needs in the several areas involved. Included in the 33-kv. lines to be built are facilities to provide loop service to areas now dependent upon single-line service. System-wide reconstruction of older section of distribution lines is scheduled in order to provide for increased capacity, maintenance of existing lines, clear main business streets in certain areas, replace overhead lines with underground lines in certain congested business areas, and to increase operating flexibility of existing lines.—*R. H. Halpenny, vice-president and executive engineer.*

California-Pacific Utilities

During 1949, $1,120,000 were spent for new and improved facilities. For 1950, $794,000 have been budgeted. Major construction for 1949 included the addition of 225 kw. in hydro generating capacity; 28 miles of transmission; 240 miles of distribution; 15,000 kva. in substation transformer capacity and 6,000 kva. in distribution capacity. Peak for 1949 was 32,000 kw., an increase of 3,000 kw. over the 29,000 kw., 1949 peak. During 1950, approximately 200 miles of distribution line, 9,000 kva. in substation capacity and 4,000 kva. in distribution transformer capacity, is expected to be added.

Central Valley Project, USBR

Installation of the fifth and last main 75,000-kw. generator was completed at Shasta Dam in April. The completion of Keswick Dam and power plant, now at the half way mark, is scheduled for October 1950. Installation of the three main 25,000-kva. generators for Keswick power plant is virtually completed. Current schedules indicate that the 4,600 cfs. Tracy pumping plant structure will be completed by early spring. A contract for construction of Tracy pumping plant switchyard was awarded in October.

The 230-kv. Shasta-Tracy East Side transmission line from Shasta to Oroville is virtually completed. The contract for completion of this line from Oroville to Tracy was awareded in November. Invitations were recently issued for construction of the 56-mile-long 230-kv. Cottonwood-Artois section of the 60-kv. transmission line from Tracy to the Contra-Costa substation is expected to begin by spring. Bids are to be invited in early summer for construction of six miles of river crossings of the Shasta-Tracy 230-kv. West Side lines.

Coast Counties G & E

Coast Counties Gas & Electric Co. expended more than $900,000 for new and improved facilities and over $200,000 for replacements during 1949. In 1950, it is anticipated that expenditures will be increased to $1,200,000 for new and improved facilities and $280,000 for replacements.

Three new distribution substations were placed in operation and 100 miles of distribution line were added to the system in 1949. Work has started on a new transmission line between Santa Cruz and Watsonville and on a new transmission substation near Gilroy. It is anticipated that in 1950 the Santa Cruz-Watsonville 100-kv. transmission line and the transmission substation near Gilroy will be completed. In addition, six new distribution substations and 93 miles of distribution line will be completed.—*R. L. Hayden, vice-president and regional manager.*

Glendale PS Dept.

Outstanding feature of the 1949 construction program of the electric division of the Glendale Public Service Department was placing in service of a new unit-type distribution substation. Five outgoing 4.3-kv. distribution feeders were placed in service during November in time to relieve badly overloaded circuits supplied from another substation. The new station,

City of Pasadena's new 35,000-kw. unit (left). Right, one of several large transformers installed by Sacramento MUD

known as Tropico substation, consists of three duplex units, each unit consisting of two feeder breakers, a tie breaker, and two 2,000-kva. transformers. All 4.3-kv. circuit breakers are of the air-break type. Transformers are equipped for tap changing under load for voltage regulation on each individual primary circuit. Two 34.5-kv. underground transmission circuits supply the station. A small brick control building houses the storage battery, supervisory equipment and pilot relays on the 34.5-kv. circuit breakers. The station will be unattended and will be operated by supervisory control.

The year also saw the completion of the initial stage of our underground construction program commenced in 1948. During the first half of the year, 100,000 ft. of fiber conduit were placed, and in the central business district 20 transformer vaults were constructed to eliminate eventually serving this district from overhead lines located in the alleys. Approximately three miles of 3-conductor 34.5-kv. gas-filled cable were placed in service on the transmission system. For the 4.3-kv. distribution system, 150,000 ft. of single-conductor non-leaded cable were installed, most of which are now in service. The final accomplishment will be the removal of several miles of heavy overhead construction from some of the main thoroughfares.

Replacement Program

The program of replacing the older overhead lines that have passed their economic life has been continued throughout 1949. Approximately 17 miles of lines were replaced during the year. The expenditures on a fiscal year basis for 1948-49 were $1,149,500, and the amount appropriated for the current fiscal year is $838,000.

Glendale's load continued to increase during the year. The peak demand of 37,300 kw. was an increase of 8.75% over 1948, and the energy consumption of 140,000,000 kwh. was an increase of 7.6% over last year. During the year 3,000 kva. of distribution transformer capacity were added to the system as well as 1,195 new service connections. — *H. E. Gulick, acting general manager.*

Los Angeles Dept. of W & P

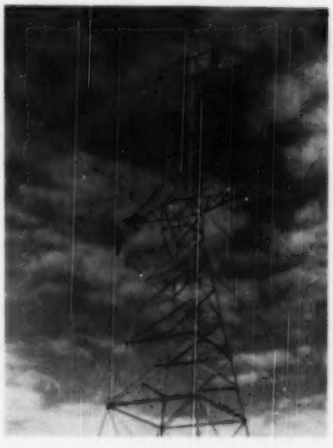
Construction expenditures for the power system of the Department of Water & Power for new and improved facilities in 1949 were approximately $38,130,000. The program for 1950 anticipates expenditures of approximately $49,950,000 for new construction and improvement of existing facilities. Both amounts are exclusive of land purchases.

Two steam electric generating units, each of 75,000-kw. capacity, were placed in service in 1949 at the Harbor steam plant. This completes the planned installation at this plant. It now has an installed rated capacity of 355,000 kw. A 2.4-mile, 138-kv., underground transmission cable and three 34.5-kv., three-phase cables connecting units No. 5 and No. 3 respectively with receiving station C were placed in service. Other high-voltage installations included 13.4 miles of 138-kv. overhead and 3.2 miles of 138-kv. cable, completing the circuits between receiving station C and the connection (known as the Gramercy switching station) to the receiving station B to receiving station D belt line for the fourth and fifth Harbor units. A 5.6-mile section of 138-kv. cable in the Gramercy to receiving station D circuit was also completed and placed in service.

Four synchronous condensers were placed in service during 1949, having the following capacities: one 48,000-kva. condenser at receiving station C, one 42-000-kva. condenser at receiving station D, two 40,000-kva. condensers at receiving station F.

The condensers at receiving stations C and D were obtained by converting a frequency changer into two condensers. This frequency changer was released at receiving station C due to the conversion of the Southern California Edison Co. system to 60-cycle operation. A new 60,000-kva., 132/34.5-kv. transformer bank was installed at receiving station D to provide for additional load growth in the area served by this station.

Transmission was big item with PG&E

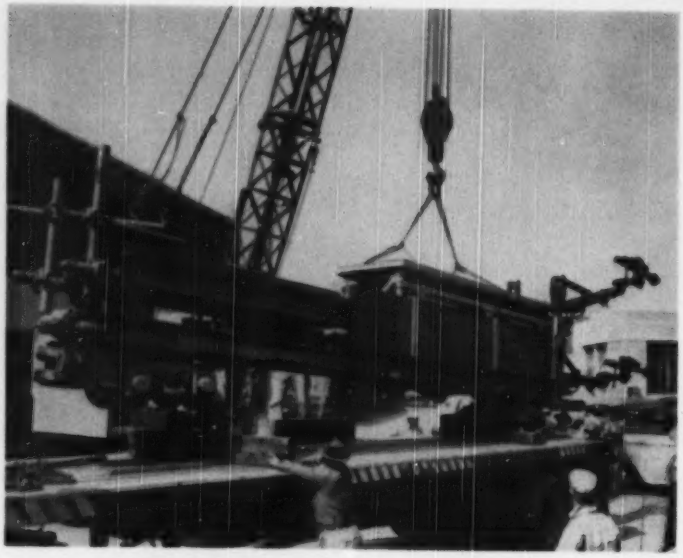


Other capacity additions on the system included: distributing stations, 149,950 kva.; industrial stations, (2,370) kva.*; commercial stations, 11,295 kva.

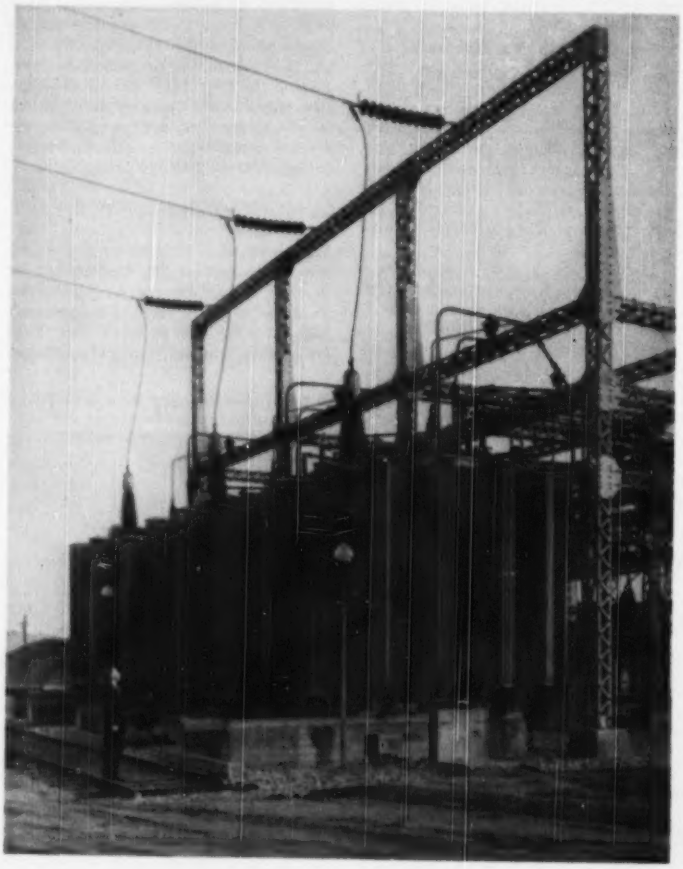
Distribution lines added were as follows: 34.5-kv. overhead, 17.9 miles; 4.8-kv. overhead, 132.0 miles; 34.5-kv. underground, 14.3 miles; 4.8-kv. underground, 21.7 miles.

Installation was started on thirty 138-kv. current limiting reactors to limit short-circuit duties on 138-kv. oil circuit breakers. Twelve of these reactors were placed in service during 1949. Carrier current relays were installed on all 138-kv. belt line circuits which did not already have this type of relay protection. The 1949 system peak, which occurred on Dec. 20, was 837,000 kw.

Construction work on the Owens Gorge hydro project will continue throughout the year. It is anticipated that the first two plants, of 37,500-kw. capacity each, will be placed in service in December. The ultimate installation will consist of three plants, totaling 112,500 kw., scheduled for completion during 1951. A single-circuit, 230-kv., steel tower transmission line, 258 miles in length, will connect the Gorge plants to the Los Angeles system at receiving station E in the San Fernando Valley. The program anticipates the addition of two 40,000-kva synchronous condensers, one at receiving station A, the other at receiving station D; also two additional 60,000-kw. 132/34.5-kv. transformer banks to be installed at receiving stations in order to provide for load growth. Estimated capacity to be added at other points on the system would include 85,450 kva. at distributing stations, 13,000 kva. at industrial stations, and 12,500 kva. at commercial stations. Additional distribution lines to be constructed are estimated to include: overhead, 30 miles of 34.5 kv. and 120 miles of 4.8 kv; underground, 17 miles of 34.5 kv. and 20 miles of 4.8 kv. The system generation peak for 1950 is estimated at approximately 875,000 kw. Work will continue on the installation of current limiting reactors on 138-kv. oil circuit breakers and the construction of additional fuel oil storage and handling facilities at the Harbor steam plant and the Olympic tank farm.—*C. P. Garman, chief electrical engineer and deputy general manager.*



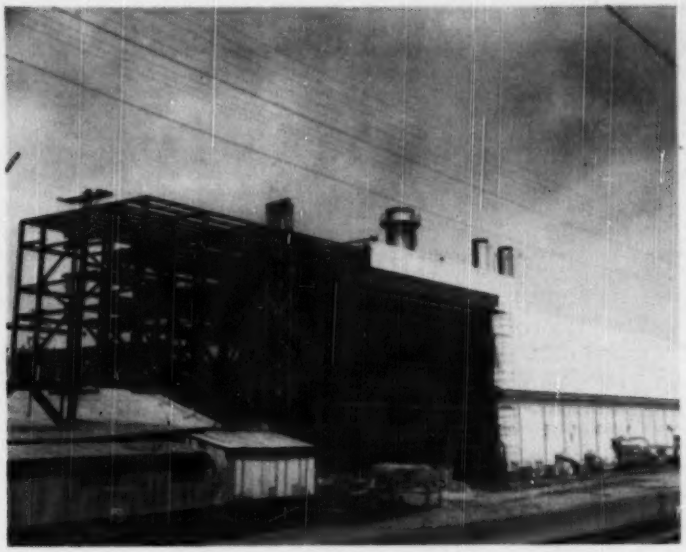
Tunneling machine and new substation of Los Angeles Dept. of Water & Power



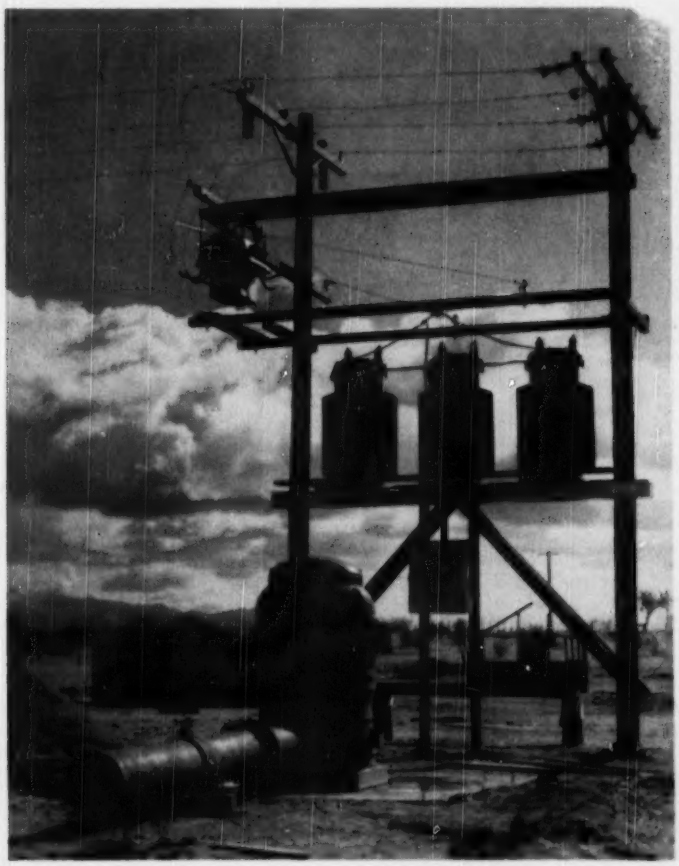
Modesto Irrigation District

Capital expenditures for 1949 were approximately $370,000 and are anticipated to be $270,000 in 1950. Major

* Net decrease in capacity resulting from removal of 37,500-kva. industrial station serving synthetic rubber plant.



Steam plant addition, San Diego Gas & Electric Co. Below, REA irrigation pump



plant additions during 1949 included: addition of one 5,000-kva. 69,000- to 12,000-volt and one 2,500-kva., 12,000- to 4,160-volt unit substations, replacement at station B of three banks of 1,500-kva. transformers with two 3,000-kva. banks, addition of one bank of 1,500-kva. transformers at rural station F.

Almost 3.5 miles of 69-kv. transmission lines were added to provide a new tie line between stations A and B with a spur to feed the new 5,000-kva. unit substation at station M. One 12,000-volt 3-phase regulator was placed in service at station A to regulate the 5,000-kva. transformer bank installed in 1948.

Approximately 1,022 new services were connected to the system for a gain of 6% in consumers. Approximately 18 miles of 12- and 4-kv. distribution lines were constructed. One underground transformer vault was constructed and 500 kva. of subway transformers installed in the downtown area. In excess of three blocks of underground duct run was constructed to provide additional 12,000-volt primary and secondary facilities for the underground system.

Major plant additions in 1950 will consist of one bank of 3,000-kva. at station A and two banks of 1,500-kva. transformers at various substations. Approximately two miles of 69-kv. transmission lines will be built.

Consumer growth should approximate the same figure as in 1949. Conversion of 4,000-volt rural lines to 12,000 volts is expected to continue in order to provide better voltage regulation for present and anticipated rural power demands. Major transmission lines will be reconstructed using heavier conductors and in some cases existing insulators will be replaced to eliminate unnecessary radio interference. Underground vault and duct run construction is contemplated to provide interconnection between existing facilities.—*C. E. Plummer, chief engineer.*

Pacific Gas and Electric

The year 1949 saw the continuance of the Pacific Gas and Electric Co.'s $600 million postwar expansion program designed to provide adequate power for the greatly increased load in the territory served by the utility, and to restore the reserve margin depleted during the war. The peak for 1949 reached 2,302,000 kw., an increase of 8.4% over the 1948 peak. Total expenditures for electrical construction in 1949 approximated $150 million, as compared with $130 million, in 1948 and an estimated total of $130 million for 1950.

The second 111,000-kw turbogenera-

Current and Future Power Transmission Lines on USBR Projects

Project	State or States	Line Terminals		Rating in Kilovolts	Line Length in Miles	Construction Type	Estimated Year of Completion
		Terminal A	Terminal B				
Boise	Idaho	Anderson Ranch power plant	Mountain Home Sub.	115	20	wood pole, H frame	1950
Yakima	Washington	Roza pumps plant No. 1	Roza pump plant No. 17	34.5	62	single pole, wood	1950
Yakima	Washington	Roza pumps plant No. 1	Roza diversion dam	13.8	2.56	single pole, wood	1950
Palisades	Idaho	Palisades power plant	Goshen	115	60	wood pole, H frame	1950
Central Valley	California	Keswick power plant	Shasta-Oroville line	230	2	steel tower	1949
Central Valley	California	Oroville	Elverta	230	56	steel tower	1950
Central Valley	California	Elverta	Perkins	230	17	steel tower, dble. circuit	1951
Central Valley	California	Perkins	Tracy	230	56	steel tower	1951
Central Valley	California	Shasta power plant	Tracy	230	213	steel tower, dble. circuit	1951
Central Valley	California	Contra Costa sub.	Clayton & Ygnacio pump plants	69	18	wood pole, H frame	1949
Davis Dam	Arizona	Davis power plant	Parker power plant	230	70	steel tower	1950
Davis Dam	Arizona	Davis power plant	Prescott sub.	230	145	steel tower	1950
Davis Dam	Arizona	Prescott sub.	USBR 230-kv. Mesa sub.	230	125	steel tower	1951
Davis Dam	Ariz.-Nev.	Davis switchyard	Hoover switchyard	230	70	steel tower	1950
Davis Dam	Ariz.-Calif.	Parker switchyard	Gila-drop 4 Line Tap at Pilot Knob	161	124.5	wood pole, H frame	1949
Davis Dam	Arizona	Phoenix sub.	Tucson sub.	115	122	wood pole, H frame	1949
Davis Dam	Arizona	Coolidge sub.	E D 5 sub	115	30	wood pole, H frame	1949
Davis Dam	Arizona	USBR 230-kv. Mesa sub.	Coolidge sub.	230	42	steel tower	1951
Davis Dam	Arizona	Tucson sub.	Cochise sub.	115	80	wood pole, H frame	1950
Davis Dam	Arizona	Gila sub.	Mesa switching station	34.5	15.5	single pole, wood	1949
Davis Dam	Arizona	Gila sub.	Welton-Mohawk pump plants	34.5	21	single pole, wood	1951
Rio Grande	N. Mex.	Alamogordo	Hollywood	115	39.0	wood pole, H frame	1949
Rio Grande	N. Mex.	Elephant Butte power plant	Socorro	115	71.82	wood pole, H frame	1949
Rio Grande	N. Mex.	Socorro	Albuquerque	115	71.76	wood pole, H frame	1951
Rio Grande	N. Mex.	Bernardo	Willard	115	54	wood pole, H frame	1951
Rio Grande	N. Mex.	Elephant Butte-Deming Line Tap	Hot Springs sub.	115	1.5	wood pole, H frame	1950
Shoshone	Wyoming	Heart Mountain	Garland sub. No. 2	69	31.00	wood pole, H frame	1949
Fort Peck	Montana	Glendive	Miles City	115	78	wood pole, H frame	1949
Fort Peck	Mont.-N. Dak.	Fort Peck power plant	Williston	115	139	wood pole, H frame	1949
Fort Peck	Montana	Havre	Shelby	115	104	wood pole, H frame	1951
Fort Peck	Mont.-N. Dak.	Glendive	Williston	115	106	wood pole, H frame	1953
Mo. River Basin	N. Dakota	Garrison Dam	Bismarck	230	65	dble. circuit steel tower	1951
Mo. River Basin	N. Dakota	Bismarck	Jamestown	230	105	steel tower	1951
Mo. River Basin	N. Dakota	Garrison	Devils Lake	115	171	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Devils Lake	Lakota	115	28	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Devils Lake	Jamestown	115	80	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Jamestown	Edgley	115	38	wood pole, H frame	1950
Mo. River Basin	N. Dakota	Edgley	Foreman	69	62	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Jamestown	Valley City	115	37	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Rugby	Rolette	69	41	wood pole, H frame	1950
Mo. River Basin	Wyo.-Mont.	Lovell	Yellowtail	115	50	wood pole, H frame	1952
Mo. River Basin	Wyoming	Garland sub. No. 2	Lovell	69	25	wood pole, H frame	1952
Mo. River Basin	Wyoming	Boysen power plant	Thermopolis	115	18	wood pole, H frame	1951
Mo. River Basin	N. Dakota	Williston	Garrison Dam	115	179	wood pole, H frame	1949
Mo. River Basin	N. Dakota	Bismarck	DeVaul sub.	69	42	wood pole, H frame	1951
Mo. River Basin	Wyoming	Boysen power plant	Alcova sub.	115	110	wood pole, H frame	1952
Mo. River Basin	Wyoming	Boysen power plant	Shoshoni	34.5	12	single pole, wood	1951
Mo. River Basin	Wyoming	Shoshoni	Riverton	34.5	24	single pole, wood	1951
Mo. River Basin	Wyoming	Thermopolis	Lovell	115	100	wood pole, H frame	1952
Mo. River Basin	Wyoming	Thermopolis	Owl Creek	34.5	4.5	single pole, wood	1951
Mo. River Basin	Wyoming	Owl Creek	Lovell	34.5	95.5	single pole, wood	1952
Mo. River Basin	N. Dak.-S. Dak.	Garrison power plant	Fort Randall power plant	230	400	steel tower	1954
Mo. River Basin	Nebraska	Gering	Sidney	115	80	wood pole, H frame	1949
Mo. River Basin	Colo.-Nebr.	Sterling	Sidney	115	40	wood pole, H frame	1949
Mo. River Basin	Wyoming	Glendo	Lusk	34.5	36	single pole, wood	1949
Mo. River Basin	Colo.-Nebr.	Sterling	Ogallala	115	88	wood pole, H frame	1950
Mo. River Basin	Wyoming	Cheyenne	Pine Bluff	115	31.4	wood pole, H frame	1949
Mo. River Basin	Nebraska	Gering	Alliance	115	48	wood pole, H frame	1949
Mo. River Basin	S. Dak.-Nebr.	Fort Randall Dam	O'Neil	115	45	wood pole, H frame	1950
Mo. River Basin	Nebraska	Alliance	Chadron	115	55	wood pole, H frame	1951
Mo. River Basin	Wyoming	Seminoe power plant	Sinclair	115	34	wood pole, H frame	1951
Mo. River Basin	Wyoming	Sinclair	Rock Springs	115	115	wood pole, H frame	1952
Mo. River Basin	Iowa-Nebr.	Sioux City	Omaha	115	195	wood pole, H frame	1952
Mo. River Basin	Iowa	Storm Lake	Spencer	115	35	wood pole, H frame	1952
Mo. River Basin	Iowa	Sioux City	Sibley	115	85	wood pole, H frame	1952
Mo. River Basin	S. Dak.-Nebr.	Fort Randall power plant	Columbus	230	152	steel tower	1953
Kendrick	Wyoming	Seminoe power plant	Casper	115	63	wood pole, H frame	1949
Kendrick	Wyoming	Medicine Bow	Hanna	34.5	20	single pole, wood	1949
Kendrick	Wyoming	Seminoe power plant	Bairoil	34.5	32	single pole, wood	1951
Colo.-Big Thompson	Colorado	West Portal, Adams tunnel	East Portal, Adams tunnel	69	13	cable in Adams tunnel	1950
Colo.-Big Thompson	Colorado	East Portal, Adams tunnel	Estes power plant	69	6	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Flatiron sub.	Greeley (south)	115	28	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Estes power plant	Marys Lake power plant	115	3.5	steel tower and H frame, wood poles	1950
Colo.-Big Thompson	Colorado	Brush	Yuma	69	51	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Wiggins	Hoyt	115	17	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Green Mountain power plant	Oak Creek	115	60	wood pole, H frame	1951
Colo.-Big Thompson	Colorado	Flatiron sub.	Greeley (north)	115	44	wood pole, H frame	1952
Colo.-Big Thompson	Colorado	Flatiron sub.	Leyner switchyard	115	27	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Leyner switchyard	Brighton	115	14	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Brighton	Brush	115	72	wood pole, H frame	1952
Colo.-Big Thompson	Colorado	Flatiron switchyard	Pole Hill power plant	115	5	wood pole, H frame	1950
Colo.-Big Thompson	Colorado	Brush	Limon	115	54	wood pole, H frame	1951
Colo.-Big Thompson	Colorado	Salida	Gunnison	115	65	wood pole, H frame	1952

tor at the extention to station P, San Francisco, was brought on the line in January 1949. Together with the first unit placed in operation in December 1948, this yields a total of 222,000 kw. of new capacity at the plant, at an approximate cost of $30 million.

The second turbogenerator at Kern steam plant, a 100,000-kw. unit, is scheduled for operation early in 1950. The first unit, 75,000 kw., was placed in service during May of 1948. The completed cost of the Kern plant will be about $30 million. The company's new Moss Landing and Contra Costa steam plants, each with three, 100,000-kw. turbogenerating units, currently are well under construction. The first Moss Landing unit is expected to be placed in operation in the spring of this year, with the remaining two scheduled for the spring of next year. All three Contra Costa units are scheduled presently for the first half of

1951. The estimated cost of each plant is $51.5 million.

Replacement of the company's 50-year-old Colgate hydro plant on the Yuba River was completed during June of 1949. A single 35,000-hp., Francis-type turbine connected to a 30,000-kva. generator replaced seven old units of 15,575 kva. total capacity. The completed cost of the plant is approximately $3,325 million.

Cresta and Rock Creek, the two hydroelectric projects on the North Fork of the Feather River, representing 75,000 kw. and 126,000 kw. respectively, are nearing completion rapidly. The first of the two Cresta units was put in service during November 1949 and the other during January of this year. Each of these units is a 37,500-kva. generator driven by a vertical, Francis-type, 46,500-hp. turbine. The total cost is estimated at $26.4 million. Rock Creek is scheduled for operation in February of this year. Each of the two generators at this plant is rated at 63,000 kva. The 73,500-hp. prime mover also is a vertical, Francis-type machine. The completed cost for Rock Creek will be approximately $35.4 million.

In a recent decision, the FPC authorized the issuance of licenses to the Pacific Gas and Electric Co. for hydroelectric developments on the North Fork of the Kings River. Preliminary work on the $60 million project will start as soon as possible this year. The company's proposed program includes three new hydro plants: the 15,000-kva. A. E. Wishon, the 120,000-kva. Haas, and the 45,000-kva. Kings River, together with expansion of the existing 33,000-kva. Balch Plant to 132,000 kva. The added capacity will approximate 279,000 kva. The proposed program also includes the construction of two storage reservoirs, Helms and Wishon, with a combined capacity of 230,000 acre-ft.

Transmission

Throughout the company's system, approximately 470,000 kva. of transmission substation transformer capacity was installed in 1949. An estimated 225,000 kva. will be added during 1950. Each of these figures represents the combined capacity installed at 230/115-kv. and 115/60-kv. substations.

Some 285 line miles of transmission line of voltages higher than 50 kv. were constructed during the year 1949. Some of the major lines placed in operation during the year were the Bucks Creek-Oroville 230-kv., 30 miles—the Panoche-Schindler 115-kv., 34 miles—the Drum-Summit 115-kv., 30 miles—and the Hopland-Willits 60-kv., 36 miles. All were single-circuit installations. Plans for 1950 anticipate the installation of approximately 255 line miles of new transmission lines. Included therein are the Moss Landing-Panoche 230-kv. and the Sunol-Moss Landing 230-kv. tower lines, 67 and 61 miles, respectively, in length. The Moss Landing-Panoche line will be a double-circuit installation, while the Sunol-Moss Landing line will be a single-circuit strung on double-circuit towers. Also planned for this year is the Willits-Fort Bragg 60-kv., single-circuit, wood-pole line, approximately 35 miles long.

Distribution

Numerous distribution substations, with secondary voltages under 50 kv. and representing approximately 430,000-kva. capacity, were constructed during the past year. It is anticipated that about 325,000 kva. of similar capacity will be installed in 1950.

During 1949, in the neighborhood of 64,000 electric customers were added throughout the system. For 1950, it is anticipated that approximately 50,000 new customers will be connected.

Distribution lines totaling approximately 2,400 line miles were constructed during 1949 with nearly 2,000 line miles in prospect for 1950. Almost all of this mileage is in rural suburban areas. — *I. C. Steele, vice-president and chief engineer.*

Current and Future Development on USBR Projects (Power Plants)

Project	State	River	Purpose*	Name of Plant	Year Initial Operation	Present kw.	Present No. of Units	Ultimate kw.	Ultimate No. of Units
Boise	Idaho	S. Fork, Boise	Irr.-P.	Anderson Ranch	1950	0	0	40,500	3
Palisades	Idaho	Snake	Irr.-P.	Palisades	1954	0	0	54,000	3
Hungry Horse	Montana	Flathead	Irr.-P.	Hungry Horse	1952	0	0	285,000	4
Columbia Basin	Washington	Columbia	F.C., Irr., P.	Grand Coulee	1941	1,000,000	12	1,974,000	21
Yakima	Washington	Yakima	Irr.-P.	Chandler	1954	0	0	12,000	2
Yakima	Washington	Yakima	Irr.-P.	Roza	1953	0	0	10,000	2
Central Valley	California	Sacramento	Irr.-P.	Shasta	1946	379,000	7	379,000	7
Central Valley	California	Sacramento	Irr.-P.	Keswick	1949	0	0	75,000	3
Central Valley	California	American	F.C.-P.	Folsom	1955	0	0	120,000	Undetermined
Parker	Ariz.-Calif.	Colorado	Irr., F.C., P.	Parker	1942	120,000	4	120,000	4
Boulder Canyon	Ariz.-Nev.	Colorado	Irr., F.C., P.	Hoover	1936	1,034,800	15	1,322,300	19
Davis Dam	Ariz.-Nev.	Colorado	Irr., F.C., P.	Davis	1951	0	0	225,000	5
Mo. River Basin	Wyoming	Big Horn	Irr., F.C., P.	Boysen	1952	0	0	15,000	2
Mo. River Basin	S. Dakota	Cheyenne	Irr., F.C., P.	Angostura	1959	0	0	1,560	1
Mo. River Basin	Montana	Missouri	Irr., F.C., P.	Canyon Ferry	1953	0	0	50,000	3
Mo. River Basin	S. Dakota	Mo-Oahe Canal	Irr.-P.	Miller Drop	1959	0	0	120,000	Undetermined
Mo. River Basin	Montana	Big Horn	Irr., F.C., P.	Yellowtail	1955	0	0	120,000	2
Mo. River Basin	Montana	Marias	Irr.	Kenil	1957	0	0	3,000	2
Mo. River Basin	N. Dakota	Souris	Irr.-P.	Crosby	1958	0	0	48,000	Undetermined
Mo. River Basin	N. Dakota	Souris	Irr.-P.	Des Lacs	1958	0	0	60,000	Undetermined
Shoshone	Wyoming	Shoshone	Irr.-P.	Heart Mountain	1949	5,000	1	5,000	1
Colo.-Big Thompson	Colorado	Transmountain Diversion	Irr.-P.	Estes	1950	0	0	45,000	3
Colo.-Big Thompson	Colorado	Transmountain Diversion	Irr.-P.	Marys Lake	1950	0	0	8,000	1
Colo.-Big Thompson	Colorado	Transmountain Diversion	Irr.-P.	Polehill	1952	0	0	36,000	1
Colo.-Big Thompson	Colorado	Transmountain Diversion	Irr.-P.	Chimney Hollow	1952	0	0	63,000	3
Colo.-Big Thompson	Colorado	Transmountain Diversion	Irr.-P.	Big Thompson	1954	0	0	6,700	1
Mo. River Basin	Nebraska	Wood	Irr., F.C., P.	Ash Creek	1956	0	0	1,980	Undetermined
Mo. River Basin	Nebraska	South Loup	Irr., F.C., P.	Georgetown	1957	0	0	1,520	Undetermined
Mo. River Basin	Wyoming	North Platte	Irr.-P.	Kortes	1950	0	0	15,000	2

*Abbreviations under Purpose: Irr. = Irrigation; P = Power; F.C. = Flood control.

Pasadena L & P Dept.

During the fiscal year 1948-1949 the department experienced another record year. Energy sold in Pasadena exceeded the previous year by 9.6%. Total operating expense increased 12.0%. Additions to capital amounted to $2,303,451, which included part of cost of the 35,000-kw. addition to the steam plant, completed in December. Betterments to distribution system consisted primarily of minor rebuilding

of pole lines. Added distribution transformers in service increased the total capacity from 65,009 to 78,131 kva. The number of meters increased from 36,598 to 39,722 in the year.

One 3,000-kva. unit substation has been installed to relieve local conditions and another will soon follow. We estimate the kwh. load and system demand during the next year will increase approximately 8%. There will be further expansion of substation and distribution capacities during the next several years, and additional steam plant capacity is being planned for completion in 1953-1954.

As is evident in this brief summary, we are faced with practically the same type of problems experienced by other utilities on the West Coast. We do not see any indication of decrease in load in the next several years, although we expect the rate of increase to be somewhat less.—*E. L. Bettannier, general manager and chief engineer.*

Riverside EL&W Dept.

The year 1949 in general followed the planned construction program with approximately $426,250 having been expended in plant improvements and additions. The program was varied due to a major change occurring in the city's wholesale power purchases. Following study of a request made by the California Electric Power Co. that the city seek a different source for the power requirements at the city's Arlington station, negotiations have been completed for the city to begin, early in the year 1950, to purchase total energy requirements from the Southern California Edison Co. The city purchased during the year the transformers and other station equipment of the California Electric Power Co. at the Arlington receiving station. The change in source further required construction of an additional 34.5-kv. transmission line to complete a loop line serving the three 5,000-kva. substations now under construction in addition to the Arlington station.

The continued general load development will require the construction of approximately 27 miles of distribution lines during the coming year. It is projected that with the completion of the subtransmission loop considerable reconstruction of existing distribution feeders will get under way.

The ever increasing average yearly consumption by domestic and commercial customers, added to the net gain in meters, is reflected in the new system demand reached this year, being 17,344 kw. as compared to the 1948 peak of 15,100 kw.

Results of the range and water heater installation and service program for customers of the department without cost proved satisfactory and will be continued. It provides for normal installations of ranges and water heaters without cost to the customer, as well as a prompt free maintenance service.—*L. W. Grayson, superintendent.*

Sacramento MUD

During 1949 $2,300,000 were spent for new distribution plant; 6,000 new customers were added making a total of 83,400 customers served at year's end; 22,000 kva. of new distribution transformers and 20,000 kva. of new distribution substations were added; 95 miles of new line were built; system peak load increased from 85,000 kw. in December 1948 to 97,000 kw. in December 1949; and 4,000 ckva. of capacitors were added to distribution lines to keep average power factor at 90 to 95%.

San Diego Gas & Electric

Although to a somewhat lesser degree, the spectacular postwar population growth of San Diego County continued in 1949. This was reflected in the increased system load of the San Diego Gas & Electric Co. The system peak for the year was 233,000 kw, an increase of 4.7% over 1948. One day in January 1949, a system peak of 253,500 was reached. However, this was not considered the peak load for the year as at that time electric demands were exaggrated due to the emergency situation which existed because of the natural gas shortage arising from the abnormal requirements due to the exceptionally cold weather. The year's increase in electric meters was in the vicinity of 8,500, and during 1949 the backlog of 2,500 electric customer applications was reduced to about 1,300.

In keeping pace with the ever-increasing demands, the company spent more than $10,500,000 in 1949 toward improving its electric department facilities alone. Major additions to the system during 1949 were the Chollas, Federal and Mission No. 4 69-kv. substations, plus the installation of new transmission lines from the Chollas station to the Otay, Federal and El Cajon substations and from the Sampson substation to station F. Construction was also begun and well under way on the Descanso, Escondido and Warner's substations and from Mission substation to Rose Canyon station. A total of more than 70 miles of transmission lines and 190 miles of distribution lines was installed. Many new 12-kv. substations were also completed at La Jolla, Bird Rock, Encinitas, Frontier, Rolando, Roseville, Spring Valley and Vista. Construction also proceeded rapidly at Silver Gate on the building extension that will house unit No. 3, another 50,000-kw. turbo-generator scheduled to be installed the latter part of 1950.

Major projects scheduled for 1950 are the completion and putting

Farm Electrification by States

State	Total Farms Jan. 1, 1945	No. Farms Electrified July 1, 1949	Unelectrified Farms July 1, 1949	Per Cent Electrified Farms
Arizona	13,142	10,965	2,177	83.4
California	138,917	131,870	7,047	94.9
Colorado	47,618	42,957	4,661	90.2
Idaho	41,498	40,501	997	97.6
Montana	37,747	23,462	14,285	62.2
Nevada	3,429	2,164	1,265	63.1
New Mexico	29,695	15,561	14,134	52.4
Oregon	63,125	62,705	420	99.3
Utah	26,327	21,279	5,043	80.8
Washington	79,887	77,146	2,741	97.6
Wyoming	13,076	8,301	4,775	63.5
Totals	494,456	436,911	57,545	

Conversion of 4-kv. distribution was continued in rural areas. Fifteen miles of rural subtransmission were reinsulated from 22 kv. to 60 kv. and are now operating at the higher voltage. ACSR conductor was used extensively for primary conductor in both urban and rural areas. No. 4 neoprene-covered aluminum was put in use on service drops. Both practices will be continued.

Budgeted for new construction in 1950 are $3,200,000 for continuing the expansion and system reinforcement program at an accelerated pace. Fifty-four hundred new customers are expected; 24,000 kva. in new substation capacity will be added to meet load growth and furnish some relief for existing substations; and the 12-kv.-fed secondary network system will be further expanded in the underground area by adding a third feeder and five 500-kva. and three 1,000-kva. network transformer units located in vaults. Peak demand is expected to increase from 97,000 kw. in 1949 to 110,000 kw. in 1950.—*Paul E. Shaad, chief electrical engineer.*

into operation of the aforementioned unit No. 3, the Escondido headquarters development, and a 69-kv. loop through the San Luis Rey Valley. New 69-kv. substations are also to be built at Rose Canyon, San Luis Rey, Monserate, Sampson and Rincon. A number of 12-kv. substations are also scheduled for installation at Encanto, Grossmont, Point Loma, Carlsbad, South Oceanside, Dehesa and Bostonia. The company also expects to build more than 40 miles of transmission lines and 120 miles of distribution lines in 1950. Capital expenditures for the year 1950 are budgeted at $10,700,000.

Southern California Edison

In 1949 Southern California Edison Co. spent approximately $66,000,000 for additions to generating capacity, new substations, transmission lines, distribution lines and additions to system facilities. For the year 1950 $51,000,000 has been budgeted for system additions and betterments. In August, the third unit was placed in service at Redondo steam plant, and in October the fourth unit went into service. The plant now has an operating capacity of 280,000 kw.

During the year, 380 miles of distribution line were constructed and 160 miles of new transmission line were placed in service. Nineteen new distribution substations were constructed during the year with a capacity of 114,000 kva. Transformer capacity of 200,000 kva. was added to existing distribution substations, and 290,000 kva. were added to existing transmission substations. Approximately 56,000 new customers and 650,000 hp. of new load were connected to the system during the year.

Unit No. 9 at Long Beach No. 2 steam plant was converted to 60-cycle operation last spring which completes the frequency conversion of all the major steam units in Long Beach No. 2 and No. 3 plants. Work has been going on all year at Big Creek No. 1 and Big Creek No. 2 covering the modernization of these two plants, originally put in service in 1913. All indoor 150-kv. buses and oil switches have been removed. A new 220-kv. outdoor switching station has been constructed at each location. The old autotransformers and indoor 150-kv. transformers have been removed. New low-voltage oil circuit breakers and isolated phase construction for the low-voltage equipment has been installed. This eliminates all the 150-kv. equipment at the company's Big Creek plants.

A new dispatcher's office was constructed at Alhambra this year, and the dispatching organization moved into these new quarters in December. The job of installing new armor rods on the two original Big Creek lines was completed this year. This work was all done without removing the lines from service. This required the design and development of special hot-line tools and equipment and was successfully carried out by the transmission division of the company. Our radio communication system has been greatly expanded during the year following the conversion of the old equipment to frequency modulation. We now have 17 fixed stations, seven repeater stations and 263 mobile units. This system has greatly facilitated the normal handling of work of the transmission, distribution and substation divisions, and in emergencies, such as wind storms, floods and fires, it has been of inestimable value in restoring service promptly.

The 1950 budget contains an item for tie-line load control equipment to be installed at the major points of inter-connections with other systems. Telemetering indications of interchange loads will be transmitted to the dispatching center. This will greatly facilitate the interchange of power between systems when necessary.

Construction was started last summer on Big Creek No. 4 and is well under way. Roads, construction camp, and river diversion work were completed some months ago, and work is in progress on dam, tunnels and power house. First concrete was placed in the dam in November. It is expected the project will be ready for service in the late summer or fall in 1951, several months earlier than originally contemplated. This plant will add 84,000 kw. of generating capacity to the system.

Construction is under way on the new Mesa to Magunden 220-kv. line. Footing installation and tower erection are well started, and stringing of conductors will start early in 1950. This line is expected to be in service by December 1950. Nine new substations are planned for 1950. These, together with the additional transformers to be installed in existing substations, will require approximately 480,000 kva. of new transformer capacity. We expect to construct 435 miles of transmission and distribution line in 1950, and to connect about 45,000 new customers.

Comment was made in last year's report on the large part of the 1949 construction money budgeted for distribution facilities. Approximately 45% of the 1950 budget is again allocated to distribution facilities. Studies are under way in the Edison organization to determine what voltage and type of distribution system are best suited to handle this rapidly expanding part of our electrical utility plant. —*N. B. Hinson, vice-president.*

REA Operation—Eleven Western States

State	Cumulative Construction Loans	1949 Loan Approvals			Energized Systems To Dec. 1, 1949		To Dec. 31, 1948	
		Amount	Estimated Miles	Estimated Consumers	Miles	Consumers	Miles	Consumers
Arizona	$ 14,645,786	$ 3,835,000	781	2,046	1,676	7,604	1,235	6,742
California	5,837,178	388,000	49	148	2,132	10,811	1,798	7,317
Colorado	33,773,528	5,152,000	1,601	3,306	13,980	40,667	12,244	36,522
Idaho	8,825,296	160,000	22	41	4,844	11,958	4,139	10,585
Montana	27,907,298	3,998,000	2,373	2,232	13,200	24,873	10,293	20,991
Nevada	316,000	30,000	0	4	164	708	147	682
New Mexico	25,628,000	13,484,000	2,905	12,732	6,534	21,055	4,361	11,913
Oregon	21,251,904	6,046,800	1,240	3,410	5,791	20,468	5,346	18,820
Utah	11,784,000	9,417,000	901	3,043	1,218	3,318	1,118	3,105
Washington	23,777,891	4,302,000	599	3,851	10,221	23,913	8,845	20,969
Wyoming	15,540,600	5,128,000	2,137	2,419	6,161	11,539	4,546	9,786
Totals	$189,287,480	$51,940,000	12,608	33,232	68,931	176,804	54,072	147,432

Turlock Irrigation District

Expenditures for electrical construction totaling $265,000 during 1949, covered a new 8,000-kva. distribution substation, four miles of 66-kv. transmission, 27 miles of 12-kv. distribution line, together with increases in equipment on existing lines. System peak increased 2,000 kw. from 16,000 kw. in 1948 to 18,000 kw. in 1949. The 1950 budget of $250,000 is expected to cover facilities for handling a continuation of load growth.—*L. H. Parker, electrical engineer.*

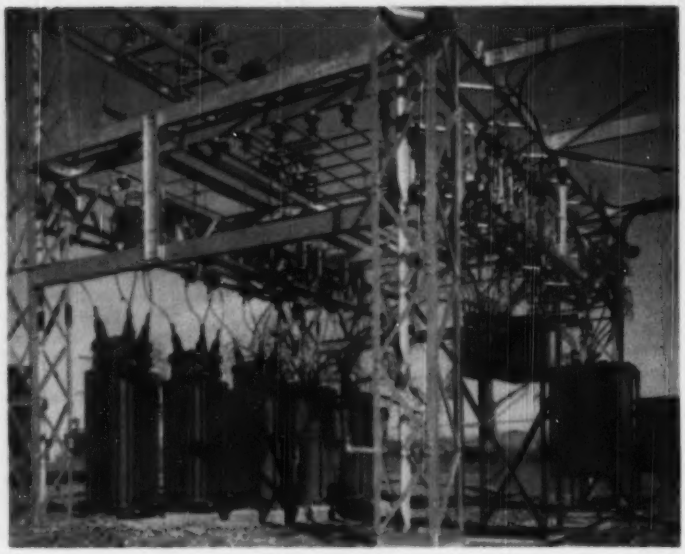
Colorado

Colorado-Big Thompson, USBR

Construction on the Granby pumping plant, a key structure of the project, is nearing completion. This structure is to house three pumps that are to be driven by 6,000-hp. motors. Invitations have recently been issued for the installation of the three motors. Construction of the Marys Lake and Estes Park power plants is about 80% completed. Invitations for construction of the 3,600-kva. Pole Hill power plant, a feature of the Estes Park Foothills power system, are expected to be issued by early summer.

Currently under construction are the following transmission lines: Flatiron-Greeley, 115-kv., about 60% completed; Brush-Yuma, about 50% completed; Wiggins-Hoyt, 115-kv., virtually completed; the 69-kv. transmission circuit through the Alva B. Adams Tunnel, about 10% completed; and the Yuma-Wray 69-kv. line, begun in November. A contract for construction of the Flatiron-Longmont-Leyner and Brighton transmission line was awarded in October.

Invitations are expected to be issued this spring for the following transmission lines: Kremmling-Oak Creek, 115-kv., 42 miles; Salida-Gunnison, 115-kv., 65 miles, and Brighton-Brush, 115-kv., 72 miles.



Wm. Scott 1,500-kva. substation of Central Colorado Power Co., near Littleton

Colorado Central Power

Our original construction budget of $500,000 for 1949 was exceeded by $50,000 because of the continued growth of our service area. Our forecast for 1949 showed a 10% increase in customers with a 15% increase in load. Final figures show 8% customer increase, 8% increase in kw. demand and 18% increase in kwh. sales. The same increases are predicted for 1950. The budget for 1950 is $500,000.

In 1949 a new 13,200-volt feeder line, five miles in length and of heavy copper was built into the town of Golden. A bank of fixed boost transformers has been installed in the original feeder line to Golden. A 1,500-kva. substation was installed in Fort Lupton as the first step toward changing the system voltage from 7,200-volt delta to 7,200/12,450-volt wye. Two miles of 7,200-volt 3-phase line completed the loop between Milliken and Johnstown. A new 1,500-kva. substation was completed in Littleton and conversion of the Littleton distribution system from delta to wye will start from this station. One 450-kva. substation near Englewood has been increased to 1,000 kva. and another station in Englewood increased from 1,500 kva. to 2,500 kva. A heavy tie line has been completed between two of the Englewood substations. The capacity of area primary feeders has been increased and another section of Englewood primary converted from delta to wye.

More 20,000-lumen mercury vapor street lights were added to the Englewood and Golden systems. The same size units were installed in the towns of Fort Lupton, Hudson, Johnstown and Milliken.

A new warehouse was completed in early 1949 near Littleton. The base of operations for the Arapahoe district line crews, service men, field engineers and radio dispatchers has been moved from the Englewood office to the new warehouse. Eight mobile radio units were installed making a total of 18 now in use. The main transmitting station was moved from Englewood to Lookout Mountain near Golden to obtain coverage of all points in our service area from one station. Remote control stations were in the Golden and Englewood offices. During 1949 we added 85 miles of new lines ranging in voltage from single-phase secondary to 13,200-volt primary. Substation transformer capacity increased 3,000 kva., distribution transformer capacity, 3,700 kva.

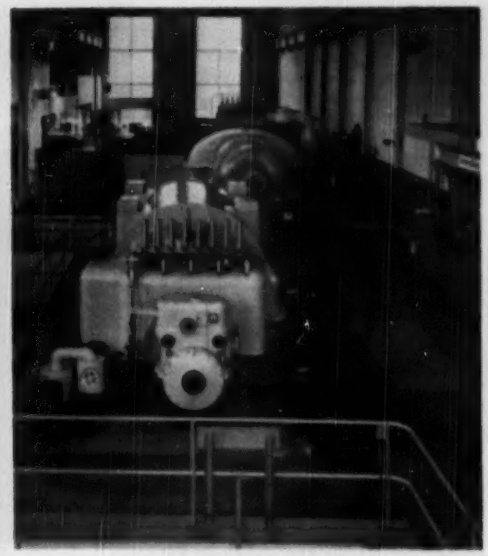
In 1950 we expect to build 50 miles of distribution line, increase substation transformer capacity by 3,000 kva. and add 2,500 kva. of distribution transformer capacity. In the Golden district a 500-kva., 13,200-volt, step voltage regulator will replace the fixed boost transformers installed in 1949. The south feeder, 4.2 miles, will be reconductored with larger wire as will 3 miles of mountain area feeder lines which will also be extended. In the Fort Lupton district a substation will be moved nearer the load center and four miles of feeder line built to serve the station at the new location. In the Arapahoe district a 2,500-kva. substation will be built in Englewood and a tie line built between the Englewood and Littleton substations. Another section of the Englewood primary lines will be converted from 2,400-volt delta to 4,160-volt wye. A section of Littleton primary also will be converted.

Mercury vapor street lighting will be installed in Platteville and more units added in Englewood. Four more mobile radio units will be installed. —*J. E. Wilson, vice-president.*

Colorado Springs PU Dept.

Approximately $1,200,000 were spent for new facilities during 1949, mostly for additional generating capacity amounting to 10,000 kw. In 1950 more emphasis will be placed on the distribution system where it is planned to expend about $620,000, but plans must be started again for further expansion of generating capacity in the years immediately following.

Anticipated load increases of about 12% for this year were very closely realized. Projections for the next few years are being based on an expected 10% per year increase in load.—*F. H. Wiley, superintendent, electric division.*



New 115-kv. line (left) of Public Service Co. of Colorado. At right is new plant of Southern Colorado Power Co.

Public Service of Colorado

Construction expenditures for the year 1949 reached an all-time high of $15,000,000; of this amount $9,200,000 was for electric facilities. Estimated construction expenditures for the year 1950 are $19,218,000, of which $14,300,000 will be spent for electric facilities. No additional generating capacity was placed in operation in 1949, but construction work on the new Arapahoe steam plant has progressed very satisfactorily and the first 40,000-kw. unit is scheduled for operation by June 1, 1950. The second 40,000-kw. unit is scheduled for operation early in 1951 and a third unit has been authorized and should be in operation during 1952. A 7,500-kw. unit has been authorized for the Grand Junction plant to be installed by 1951.

Three new 115-kv. terminal substations in the Denver area with a capacity of 60,000 kva. were completed during 1949. Some 20 miles of 115-kv. circuit were constructed during the year to supply these terminal substations. During the year 1950 the 115-kv. ring around the city of Denver will be completed. Other construction work completed during 1949 added 38,000 kva. of substation transformer capacity, 35,000 kva. of distribution transformer capacity and 378 miles of distribution lines.

The 1950 construction program calls for the addition of 122,000 kva. of substation transformer capacity, 30,000 kva. of distribution transformer capacity, approximately 200 miles of distribution lines and approximately 100 miles of 115-kv. and 69-kv. transmission lines. The company added 10,000 new electric customers during the year 1949. It is estimated that 8,000 will be added in 1950.

Southern Colorado Power

The amount of new construction in 1949 was $1,875,000. The principal amount was for the completion of a 15,000-kw. addition to the Pueblo steam plant. This unit is powered by one 185,000 lb. per hour boiler, which is fired with natural gas and has pulverized fuel as a stand-by. It has full Bailey control and hydrogen cooling on the generator. This addition was authorized in July 1946, and placed in operation in June 1949. To supplement the water supply from the Arkansas river, and for use during adverse river conditions, an 18-000-gal. Marley cooling tower was installed.

In connection with the distribution of the 14.4 kv. output from the generator, an outdoor substation was constructed with a double-bus and fourteen 15-kv. circuit breakers with interrupting capacity of one million kva. each. The engineering was done by Pioneer Service and Engineering Co. of Chicago, and the construction by Stearns-Roger Mfg. Co. of Denver.

There were 40 miles of distribution lines, 1,500 kva. of substation transformers, and 5,442 kva. of distribution transformers added during 1949. The net gain in meters was 1,752. System peak was 30,970 kw.

The construction budget for 1950 is estimated to be $2,038,000. Principal item is: One 7,500-kw. steam turbo-generating unit is now on order and is to be installed in the city of Rocky Ford, Colo. Steam conditions are 600 lb. pressure, 825° total temperature. It will be powered by one 100,000 lb. per hour boiler, fired with natural gas with oil as stand-by. Circulating water will be by deep well and ditch water and cooled by an induced draft tower. Contemplated date of completion is March 1951. Engineering and construction is by Stearns-Roger Mfg. Co. of Denver.

Twenty-five miles of distribution lines, 7,500 kva. of substation transformers, and 5,000 kva. of distribution transformers will be added in 1950. The estimated meter purchase is 2,100 meters.—*M. L. Lord, vice-pesident in charge of operation.*

Idaho

Boise Project, USBR

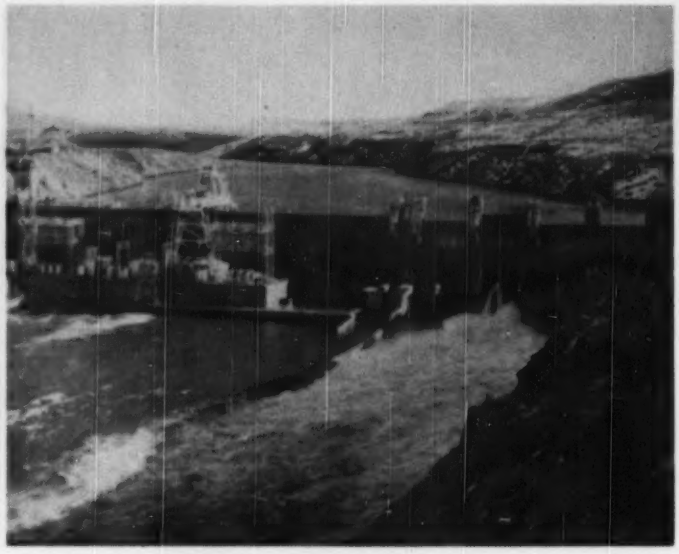
Construction of the spillway and power plant for Anderson Ranch Dam, highest earth-fill dam in the world, is about 70% completed. Award of the contract for installation of electrical, mechanical, and hydraulic equipment in the power plant, outlet works, and switchyard, including two 18,500-hp. vertical-shaft turbines and two 15,000-kva. generators, is expected to be made early this year.

Idaho Power

During 1949 Idaho Power Co. carried out a construction program involving the expenditure of approximately $22,000,000, the largest program in the history of the company. During the year the Lower Salmon development, with 65,000-kw. capacity, was completed, and one of the three 25,000-kw. units at the Bliss development went on the line the last part of November, with a second unit ready for operation immediately after the first of the new year.

Transmission lines completed during 1949 consisted of nine miles of 46-kv. line, 53 miles of 69-kv. line, and 80 miles of 138-kv. line. Approximately 268 miles of line construction was started that will be completed in 1950. Of this, 136 miles is 138 kv. and 132 miles is 69 kv.

Distribution substation capacity was increased 135,000 kva. during 1949 and it is estimated that it will be increased by 60,000 kva. in 1950. Expansion of substation facilities involves the complete replacement of several stations, with a combined capacity of about 20,000 kva. with new stations of modern design having a combined capacity of about 60,000 kva. New stations, with a total capacity of 60,000 kva. are being installed, and facilities and capacities at all other stations are being greatly augmented and expanded. Approximately 800 miles of distribution line were added to the system during the year, however it is estimated that the line extension program reached its peak this year and will taper off to about 500 miles of total extensions in the coming year. By the end of 1950 the company will have, since V-J Day, increased its plant investment by 225%, added approximately 150,000 kw. of load, and 45,000 customers to its system.—*B. C. Russell, general superintendent.*



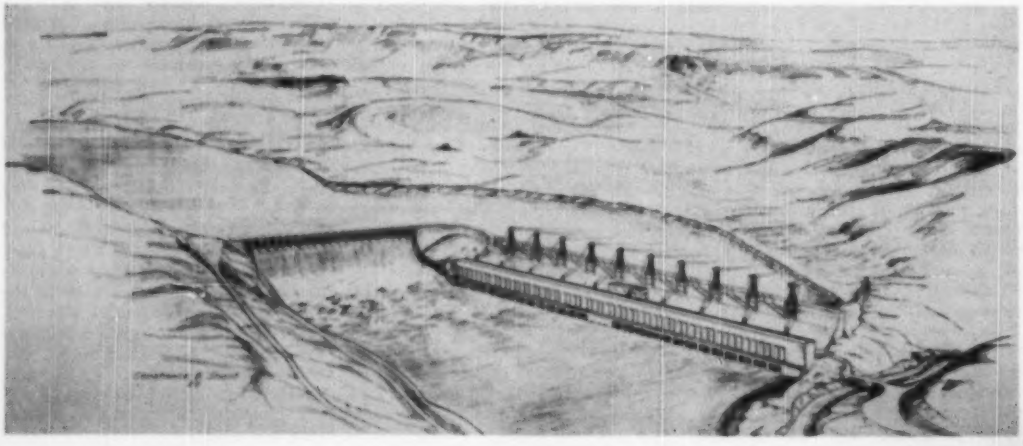
69,000-kw. Snake River Bliss hydroelectric plant of the Idaho Power Co.

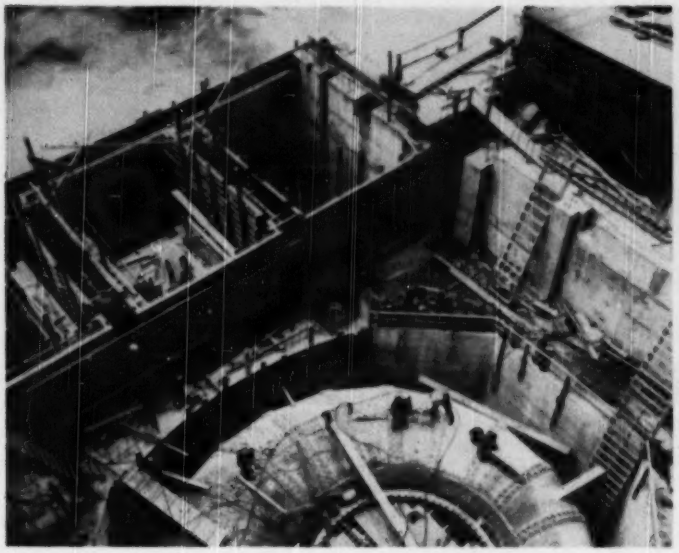
Montana

Montana Power

A steadily moving program of construction and improvements, carried out by the Montana Power Co. in 1949 to enable the company to stay ahead of present and future demands for power in its service area, will be continued in 1950. Major project for 1950 will be the start of construction of a 66,000-kw. steam-electric generating station at Billings, Mont., center of a rapidly growing industrial and agricultural area referred to as the Midland Empire. Construction of the station will commence March 1, 1950, with the plant expected to be in opration by August 1951. The plant will have a single turbogenerator supplied by a single boiler. The turbine will operate at 850 psi. and at a temperature of 900°F.

Chief Joseph plant on the Columbia River being built by the Army Engineers will have 27, 64,000-kw. generators





Scrollcase of 50,000-kw. Montana Power Co. Kerr unit is lowered into place

The semi-outdoor station will be designed to burn residual fuel oil, natural gas or coal. Residual oil now is available from large refineries in the Billings area.

Construction of transmission and distribution lines and facilities to bring added service to various communities and areas served by the Montana Power Co. also will be undertaken during the year. During 1949 the system was increased to 405,000 kw. with the installation May 27 of a second 56,000 kw. generating unit at the company's Kerr hydroelectric plant on the Flat River near Polson, Mont. This project, which started in the spring of 1947, also included construction of an addition to the Kerr plant power house and the driving of a 28-ft. tunnel through 800 ft. of rock between the dam and the power house.

Construction of a 200-mile transmission line of 100 kv. connecting Great Falls and Billings, Mont., was completed in March 1949. The line gives Billings a second source of power, inasmuch as it parallels another 100-kv. line which has been serving that area since 1940. Also completed in July 1949 was a project which consisted of construction of a 100-kv. transmission line from Townsend to Trident, a distance of 29 miles, and re-energizing of a transmission line from East Helena, near the Montana Power Co.'s Holter hydroelectric plant, to Townsend. The latter line was increased from 10,000 to 100,000 volts. The Townsend-Trident line, in addition to serving a growing farm area, provides a triple source of power for the Ideal Cement Co. plant at Trident, one of the largest plants of its kind in the intermountain northwest, and provides emergency power for the Chicago, Milwaukee, St. Paul and Pacific Railway.

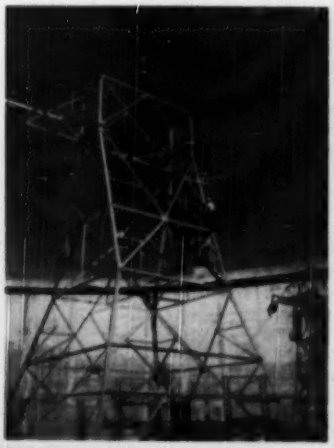
Two hundred twenty-four miles of transmission line and 15 substations in the Great Falls-Chester-Havre area of northern Montana were cut over to new higher voltage of 69 kv. during August 1949, nearly doubling the capacity of lines serving towns in the region. This project, designed to increase facilities for the company's service area, is part of an over-all program which also will see an increase in voltage for lines serving other sections of northern Montana.

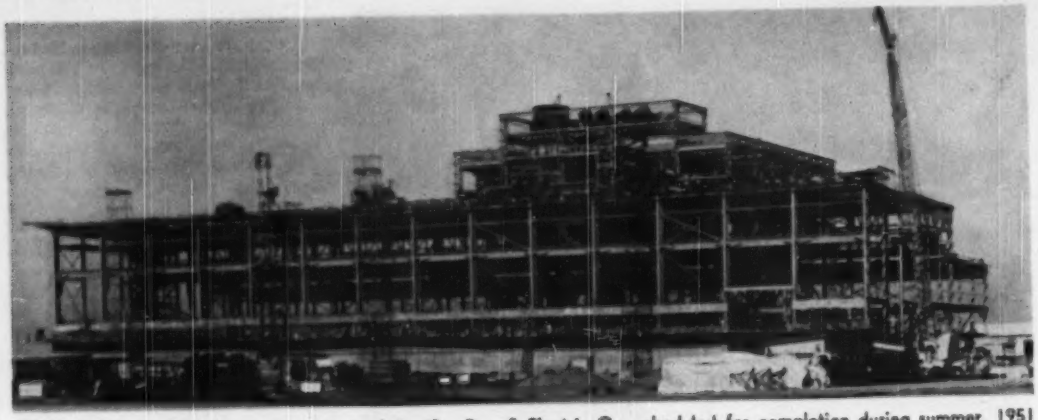
A number of localized projects also were carried on during the 1949 year, resulting in additional distribution lines, increased voltage and other improvements to system facilities.

Fort Peck Power Project, USBR

A contract for construction of the 115-kv., 110-mile-long Havre - Shelby transmission line was recently awarded. Currently under construction are the following substations: 1,500-kva., Circle, Mont.; 7,500-kva., Wolf Point, Mont.; 2,000-kva., Savage, Mont.; 1,500-kva., Watford City, N. D.; 15,000-kva., Williston, Mont.

McNary Dam (left), Walla Walla District Army Engineers. Right, Merwin plant transmission of Pacific Power & Light Co.





Contra Costa 300,000-kw. steam plant of Pacific Gas & Electric Co. scheduled for completion during summer, 1951

Calendar of New Generation

(1948 installations have been dropped and 1955 added.)

1949—Completed

Date	Size	Plant	Agency
Jan. 1	20,000 kw. (S)	El Centro	Imperial Irrig. Dist.
Jan.	5,000 kw. (H)	Heart Mt.	USBR
Jan.	111,000 kw. (S)	Station P	P.G. and E.
Jan. 25	15,000 kw. (H)	Lower Salmon	Idaho Power
Feb. 25	75,000 kw. (S)	Harbor	L. A. Dept. of W. & P.
Feb.	75,000 kw. (S)	Shasta	USBR
March 12	15,000 kw. (H)	Lower Salmon	Idaho Power
April	75,000 kw. (H)	Shasta	S. C. Elec.
May 6	45,000 kw. (H)	Bridge River	USBR
May	108,000 kw. (H)	Grand Coulee	USBR
May	56,000 kw. (H)	Kerr	Montana Power
May	30,000 kw. (H)	Colgate	P.G. and E.
June 13	30,000 kw. (H)	Tempe	Salt River Project
July 1	7,500 kw. (S)	Tucson	Tucson G. E. L. & P.
July 11	12,500 kw. (S)	Lower Salmon	Idaho Power
July 14	15,000 kw. (H)	Harbor	L. A. Dept. of W. & P.
July	75,000 kw. (S)	Grand Coulee	USBR
July	108,000 kw. (H)	Redondo	So. Calif. Ed.
Aug.	70,000 kw. (S)	Lower Salmon	Idaho Power
Sept. 8	15,000 kw. (H)	Redondo	So. Calif. Ed.
Oct.	70,000 kw. (S)	Keswick	USBR
Oct.	25,000 kw. (H)	Grand Coulee	USBR
Oct.	108,000 kw. (H)	Santa Fe	Pub. Ser. of N. M.
Nov.	6,000 kw. (S)	Cresta	P.G. and E.
Nov. 26	17,500 kw. (H)	Bliss	Idaho Power
Nov. 30	23,000 kw. (H)	Steam Plant	Colo. Springs Dept. P.U.
Dec. 1	10,000 kw. (S)	Watterville	Eugene Water Bd.
Dec. 3	7,500 kw. (H)	Marvin	Pacific P. & L.
Dec. 5	50,000 kw. (H)	Bridge River	S. C. Elec.
Dec. 7	45,000 kw. (H)	Tucson	Tucson G. E. L. & P.
Dec. 23	11,500 kw. (S)	Bliss	Idaho Power
Dec. 30	23,000 kw. (H)	Pasadena	Pasadena L. & P. Dept.
Dec.	35,000 kw. (S)	Keswick	USBR
Dec.	25,000 kw. (H)	Tokatee	Calif. Ore. Power
Dec.	42,500 kw. (H)	Pueblo	So. Colorado Power Co.
Dec.	15,000 kw. (S)		

1950—Planned

Date	Size	Plant	Agency
Jan.	37,500 kw. (H)	Cresta	P.G. and E.
Jan. 10	7,500 kw. (H)	Leaburg	Eugene Water Bd.
Jan. 15	13,500 kw. (S)	Steam Plant	Eugene Water Bd.
Feb. 1	23,000 kw. (H)	Bliss	Idaho Power
Feb.	126,000 kw. (H)	Rock Creek	P.G. and E.
Feb.	100,000 kw. (S)	Kern	P.G. and E.
Feb.	25,000 kw. (H)	Keswick	USBR
April	40,000 kw. (S)	Owen	Utah P. & L.
April	24,000 kw. (H)	Kortes	USBR
April	108,000 kw. (H)	Grand Coulee	USBR
Spring	100,000 kw. (S)	Moss Landing	P.G. and E.
May	40,000 kw. (S)	Arapahoe	Pub. Ser. of Colo.
May	15,000 kw. (H)	Estes	USBR
May	8,100 kw. (H)	Marys Lake	USBR
June	10,000 kw. (H)	Grand Coulee	USBR
July	108,000 kw. (H)	Grand Coulee	USBR
Aug.	13,500 kw. (H)	Anderson Ranch	USBR
Sept. 1	50,000 kw. (S)	Silver Gate	San Diego G. & E.
Oct.	35,000 kw. (H)	Ruskin	S. C. Elec.
Oct.	108,000 kw. (H)	Grand Coulee	USBR
Oct.	12,000 kw. (H)	Kortes	USBR
Oct.	45,000 kw. (H)	Davis	USBR
Nov. 1	40,000 kw. (S)	Waiau	Hawaiian Elec.
Nov.	13,500 kw. (H)	Anderson Ranch	USBR
Dec.	18,000 kw. (H)	Slide Creek	Calif. Ore. Power
Dec.	75,000 kw. (H)	Owens Gorge	L. A. Dept. of W. & P.
Dec.	45,000 kw. (H)	Davis	USBR

1951—Planned

Date	Size	Plant	Agency
Jan.	45,000 kw. (H)	Davis	USBR
Feb.	45,000 kw. (H)	Davis	USBR
March	45,000 kw. (H)	Davis	USBR
March	40,000 kw. (S)	Arapahoe	Pub. Ser. of Colo.
April	40,000 kw. (H)	Gorge	Seattle City Light
April	108,000 kw. (H)	Grand Coulee	USBR
April	200,000 kw. (S)	Moss Landing	P.G. and E.
Spring	37,500 kw. (H)	Owens Gorge	L. A. Dept. of W. & P.
June	300,000 kw. (S)	Contra Costa	P.G. and E.
Summer	108,000 kw. (H)	Grand Coulee	USBR
July	66,000 kw. (S)	Billings	Montana Power
July	84,000 kw. (H)	Big Creek 4	So. Calif. Ed.
Aug.	60,000 kw. (S)	Salt Lake	Utah P. & L.
Aug.	108,000 kw. (H)	Grand Coulee	USBR
Oct.	11,250 kw. (H)	Soda Springs	Calif. Ore. Power
Oct.	82,500 kw. (H)	Hoover	USBR
Nov.	50,000 kw. (H)	Hoover	USBR
Nov.	7,500 kw. (S)	Grand Jun.	Pub. Ser. of Colo.
Indefinite	6,000 kw. (S)	Santa Fe	Pub. Ser. of N. M.

1952—Planned

Date	Size	Plant	Agency
Jan.	82,500 kw. (H)	Hoover	USBR
April	15,000 kw. (H)	Boysen	USBR
July	6,000 kw. (H)	Fish Creek	Calif. Ore. Power
Oct.	20,000 kw. (S)	Glen Isle	Glendale P. S. Dept.
Oct.	15,000 kw. (H)	Clearwater No. 2	Calif. Ore. Power
Oct.	71,250 kw. (H)	Hungry Horse	USBR
Oct.	16,667 kw. (H)	Canyon Ferry	USBR
Nov.	40,000 kw. (S)	Arapahoe	Pub. Ser. of Colo.
Dec.	72,250 kw. (H)	Hungry Horse	USBR
1952	15,000 kw. (S)	Steam Plant	Colo. Springs Dept. P.U.
'52 or '53	50,000 kw. (S)	Silver Gate	San Diego G & E.
'52 or '53	27,000 kw. (H)	Cushman No. 2	Tacoma City Light
Indefinite	15,000 kw. (S)	Albuquerque	Pub. Ser. of N. M.

1953—Planned

Date	Size	Plant	Agency
Jan.	16,667 kw. (H)	Canyon Ferry	USBR
April	63,000 kw. (H)	Flatiron	USBR
April	30,000 kw. (H)	Pole Hill	USBR
June	50,000 kw. (H)	Detroit	Army Engrs.
July	13,000 kw. (H)	Clearwater No. 1	Calif. Ore. Power
Aug.	270,000 kw. (H)	Ross	Seattle City Light
Aug.	71,250 kw. (H)	Hungry Horse	USBR
Oct.	20,000 kw. (H)	Lemolo No. 1	Calif. Ore. Power
Nov.	71,250 kw. (H)	Hungry Horse	USBR
Dec.	20,000 kw. (H)	Lemolo No. 2	Calif. Ore. Power
Dec.	18,000 kw. (H)	Big Cliff	Army Engrs.
Dec.	50,080 kw. (H)	Detroit	Army Engrs.
Dec.	140,000 kw. (H)	McNary	Army Engrs.

1954—Planned

Date	Size	Plant	Agency
April	16,667 kw. (H)	Canyon Ferry	USBR
April	70,000 kw. (H)	McNary	Army Engrs.
July	6,700 kw. (H)	Big Thompson	USBR
Aug.	70,000 kw. (H)	McNary	Army Engrs.
Dec.	70,000 kw. (H)	McNary	Army Engrs.
Before '55	345,000 to 460,000 kw. (H)	Cowlitz	Tacoma City Light

1955—Planned

Date	Size	Plant	Agency
April	70,000 kw. (H)	McNary	Army Engrs.
May	160,000 kw. (H)	Folsom	USBR
Aug.	70,000 kw. (H)	McNary	Army Engrs.
Dec.	130,000 kw. (H)	Ice Harbor	Army Engrs.
Dec.	70,000 kw. (H)	McNary	Army Engrs.

Nevada

Sierra Pacific Power

Sierra Pacific Power Co.'s electric department expended $2,500,000 for additions and betterments in 1949. The budget for 1950 will approximate $1,000,000.

Larger items in the 1949 construction program were: 72 miles of 120-kv. H-frame line (operated now at 60 kv.); 70 miles of single-pole 60-kv. line; installation of underground apparatus and cables in a portion of Reno's business district to replace overhead wires; addition of 8,000 kva. of distribution substation transformers. Several segments of rural distribution were converted from 2,400 volt to 12 kv. wye.

No large construction jobs are planned for 1950. Fifty per cent of the proposed expenditures represent short-line extensions, line transformers, meters, service and scattered pole replacements. One transformer bank of 45,000-kva. capacity, 120/60 kv., will be installed in California substation. —*V. D. Armstrong, Engineer.*

New Mexico

PS of New Mexico

During 1949, approximately $3,000,000 were spent in capital improvements by the four divisions of the Public Service Co. of New Mexico. A total of $2,250,000 has been budgeted for 1950. A new steam plant at Santa Fe housing a 6,000-kw. turbo-generator was the only capacity added during 1949. No new capacity will be installed during 1950, but it is anticipated that an additional 6,000-kw. unit will be installed at Santa Fe in 1951, and a 15,000-kw. unit in Albuquerque in 1952.

Approximately three miles of transmission and about 60 miles of distribution line were added in 1949. A 6,000-kva. transmission substation and a 5,000-kva. 3-circuit distribution station were added in Santa Fe and four new substations in Albuquerque totaling 8,250 kva. About 16,000 kva. were added in line distribution transformers. The Albuquerque-Santa Fe system peak increased better than 7,500 kw. to a total of 42,400 kw., or 21.5% over 1948. Kilowatt-hours for the entire system increased 15%.

Capital expenditures in 1950 will practically all be for extending and reinforcing the distribution systems. It is expected that about 15 miles of transmission and from 60 to 75 miles of distribution lines will be added. Seven new distribution substations will be installed, totaling 12,500 kva. and 5,000 kva. will be added to existing substations in Albuquerque. We anticipate installing approximately 20,000 kva. in distribution transformers and about 5,000 meters in 1950. All indications point to a continued increase in both demand and consumption.—*E. M. Cornwell, electrical engineer.*

Oregon

Bonneville Power Administration

Peak demand on Bonneville and Grand Coulee plants was 2,035,000 kw. on Dec. 21, 1949. This is expected to be the peak for the year. Almost 13 and one-half billion kilowatt-hours was produced at these two plants during 1949 for distribution over Bonneville Power Administration's transmission system to 101 customers. Revenues from the sale of this power amounted to $29 million. Increases over the 1948 calendar year were: peak demand 22%, generation for Bonneville Power Administration 10%, number of customers 10% and revenue 10%.

Expenditures for new and improved facilities during 1949 amounted to $33,000,000. Approval of the present budget before Congress, including the supplemental request, will increase that figure to an estimated $40,000,000 in 1950. The increase is largely due to an expanded transmission line program to keep pace with the schedule of additional generating plant installations.

Peak generating capacity was increased by 360,000 kw. installed at Grand Coulee Dam during the year. Scheduled additions for 1950 include three additional units at Grand Coulee, bringing the total to 15 by the end of the year. In southern Idaho 40,000 kw., in two units, will be installed at the USBR Anderson Ranch Dam during the year 1950.

Transmission system additions during 1949 included 219 miles of 230-kv. and 147 miles of 115-kv. line, and 597,450 kva. of transformer capacity. Plans for 1950 call for 347 miles of 230-kv. and 153 miles of 115-kv. line, with added transformer capacity of 419,000 kva.

Short term contracts (one year) have been executed with the five major private utilities in the western part of the region for delivery of 311,000 kw. during the 12-month period ending Sept. 30, 1950. Companies included are: Pacific Power and Light Co.; Washington Water Power Co.; Portland General Electric Co.; Puget Sound Power & Light Co.; and the Mountain States Power Co.

Peak requirements of approximately 5,350,000 kw. will need to be met by the federal system in 1958, according to the most recent estimates of the Bonneville Power Administration. This represents more than double the current load. In order to provide for reserves and the replacement of steam electric generation in addition to firm power requirements, total federal installations in the Pacific Northwest region of nearly 6½ million kilowatts are planned for installation by 1958.

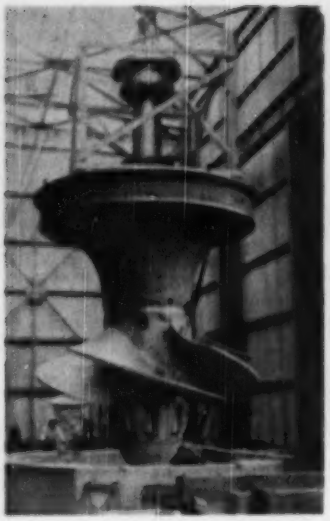
California Oregon Power

Approximately $9,800,000 were spent during 1949 for plant additions and improvements. Construction of the Toketee hydroelectric plant progressed rapidly; two of the three generators installed in the power house now are in operation, adding 28,334 kw. to the company's generating capacity. Construction of the Toketee plant, and preliminary work on other new hydroelectric plants on the North Umpqua River accounted for approximately $5,500,000 of the above expenditure. Additions to and improvements of the transmission and distribution facilities accounted for the expenditure of about $4,300,000, covering such major items as construction of two transmission lines (66 kv. and 120 kv.) from Riddle to Days Creek, Ore. (19 miles), and from the Toketee plant to Dixonville, Ore. (49 miles), and expansion of the company's distribution facilities to keep pace with an unprecedented growth of population and demand for power.

The company's total demand (retail and wholesale) reached a peak of 191,240 kw. on Dec. 5, 1949, an increase of about 9,370 kw. over the 1948 peak demand.

1950 Budget

The 1950 budget contains approximately $9,800,000 for plant improvement and expansion. Completion of the Toketee and Slide Creek plants (adding 32,167 kw. of generating capacity), and work during 1950 on other new hydroelectric plants in the North Umpqua River project, will cost about $5,000,000. Improvement and expansion of the transmission and distribution system to satisfy the continuing increase in demand will cost about $4,800,000. A 120-kv. transmission line from Days Creek to Grants Pass, Ore., and a 66-kv. line from Dorris to Tulelake Basin, Calif., are scheduled for construction during 1950.



Kaplan runner (left) for Eugene's new Walterville plant. At right is shown Bonneville's new dispatching board

Eugene Water Board

Eugene's rapid growth during the past four years continues and many improvements are planned for the electric distribution system during the coming year. In 1949, a total of $3,600,000 was spent on new facilities. Major expenditures were made for completing 11,500 kw. of steam and 12,500 kw. of hydro generation. In addition, 50,500 kva. were added in distribution substation transformer capacity.

The 1950 budget calls for an expenditure of $1,600,000. Major items are: $620,000 for distribution improvements; $230,000 for transmission, including a 66-kv. ring; $152,000 for completion of the steam plant; $83,000 for work on the second 7,500-kw. unit at the Leaburg hydro plant, and $153,000 for completion of an additional 5,000-kw. unit at the Walterville hydro plant.

The system peak for 1948 of 37,500 kw. increased 1,250 kw. to 38,750 kw. for 1949.—*R. B. Boals, general superintendent.*

McNary Dam, Army Engineers

At the conclusion of the 1948-49 fiscal year, June 30, 1949, the McNary project was 9% complete. During the fiscal year 1949-50 construction continued on the Washington shore under a contract covering the navigation lock, fish ladder and fish lock, 13½ bays of the spillway, and the Washington abutment embankment. The contract covering the Oregon shore cofferdams, excavation and substructure for two units of the power house, and part of the Oregon abutment embankment was awarded in September 1949, and construction is now under way. At the end of the present 1949-50 fiscal year, the entire McNary project will be approximately 31% complete. Appropriation for fiscal year 1950 totals $35,000,000.

Pacific Power & Light

During the year 1949 Pacific Power & Light Co. spent approximately $9,000,000 on system additions and improvements. This established a new record for such expenditures. Major project for the year was completion of the installation of a second 45,000-kw. generator at the Merwin hydroelectric project. This work was started late in 1948 and the unit put in operation early in December 1949. Coupled with this project was the construction of a new 110/66/11-kv. Albina substation in Portland with transformers having a total maximum capacity of 166,666 kva. The Merwin-Albina transmission line, formerly operated at 66 kv., was converted to 110 kv.

The initial step was taken in the development of a 110-kv. transmission ring around the fast growing city of Yakima, Wash., with approximately nine miles of 110-kv. transmission circuit connected to a 15,000-kva., 110/12-kv. substation. Other items in the 1949 construction program included replacement of ten miles of 66-kv. transmission line between The Dalles and Dufur with a new line of much higher capacity; increasing the conductor size on 15 miles of 66-kv. transmission line between Dufur and Tygh Valley, and increased capacity at a number of substations to provide for increased load growth.

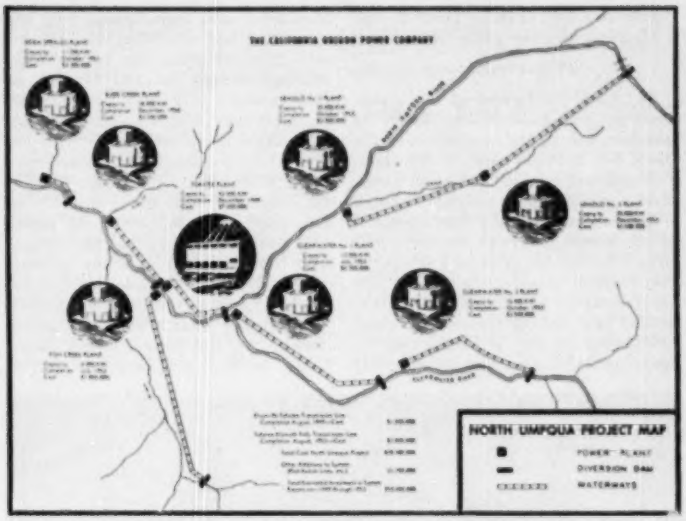
The 1950 construction program provides for approximately the same amount of improvements and additions as were made in 1949, exclusive of the Merwin project. Included in this are items for the continuation of the 110-kv. transmission ring at Yakima with an additional 15,000-kva. substation, a 110-kv. tie with BPA at Grandview, and many miscellaneous substation and distribution additions and improvements.—*D. R. McClung, vice-president.*

Portland District, Army Engineers

The only project, other than Bonneville Dam on the Columbia River, of the Portland District, Corps of Engineers, embracing power development is Detroit Dam, now under construction on the North Santiam River, a tributary of the Willamette River, 12 miles East of Mill City, Ore.

The Detroit multiple-purpose project was initiated on March 30, 1949, with commencement of construction of the concrete gravity dam, complete with outlet gates and valves, penstocks, trashracks, stilling basin, control house, and all other appurtenant structures. The contract for this work, totaling $28,230,509, is held by Consolidated Builders., Inc.

Detroit Dam will be an all-concrete, straight-gravity structure, including the spillway and abutment seitions. It will be 1,580 ft. long, 463 ft. high from



Chain of developments planned by the California Oregon Power Co. At right are shown penstocks of the Toketee plant

foundation to deck, and 28 ft. wide with a road atop 20 ft. wide. Total rated power installation will be 100,000 kw. An integral part of the Detroit project is the Big Cliff reregulating reservoir, to be located 2.8 miles downstream from the main dam. It will have an 18,000-kw. power installation.

The completed Detroit Dam, including the power house and the reregulating reservoir, will cost an estimated $70,000,000. Part of the Corps of Engineers' Willamette River Basin Flood Control project, the dam will provide flood control, power and conservation of water for irrigation, navigation, fish life use and pollution abatement.

Depending on appropriations by the Congress, both Detroit Dam and the Big Cliff reregulating reservoir are scheduled for completion during 1953.

Portland General Electric

Our 1949 construction expenditures amounted to $7,000,000. Our present estimate for 1950 is $6,700,000. The 1949 peak was 7% greater than 1948 and the kwh. for 1949 was 5½% greater than for 1948. No load molding was necessary over the December 1949 peak.

BPA's 250,000-kva. 230/57-kv. transformer with 13.8-kv. tertiary winding was energized in September. The 13.8-kv. winding carries two 35,000-kw. pot lines at the Troutdale aluminum plant. The 57-kv. winding is connected to PGE Co.'s system by two 795-MCM ACSR transmission lines which have their Portland terminals at Lents and Tabor substations. BPA has extended its 115-kv. line from Forest Grove to McMinnville and has removed one of its two 50,000-kva. 115/57-kv. transformer banks from St. Johns substation in North Portland and is installing this bank at McMinnville. The company is building a 5-mile 57-kv. line from McMinnville substation to the company's Dayton substation. This line is scheduled to be energized in January 1950.

The company's distribution program for both 1949 and 1950 consists mainly in installing 57/4.15-kv. distribution substations in Portland and Salem and 57/12.5-kv. substations in outside areas. A large number of switched capacitor units were installed at distribution substations in 1949 and additional similar units will be installed in 1950. These will be supplemented by unswitched pole-mounted capacitor units.—*John Bankus, chief engineer.*

Utah

Telluride Power

During 1949 an estimated $250,000 was spent for new construction. Budgeted for 1950 is $200,000. Major construction the past year consisted of adding 40 miles of distribution line; 900 kva. in substation capacity and 905 kva. in distribution transformer capacity. Peak for 1948 was 9,630 kw.; for 1949, 10,600 kw.

For 1950, 25 miles of distribution is planned. Substation capacity will be increased by about 500 kva. and an estimated 300 kva. will be added in distribution transformer capacity.

Utah Power and Light

Utah Power & Light Co's 1949 construction program was highlighted by peak activity on unit No. 2 at the Orem steam electric station and the start of construction of unit No. 1 at the new Salt Lake steam electric station. Orem No. 2 is to be a 40/44-mkw. plant on which about $3,500,000 has been spent. Ultimate cost is estimated at $7,400,000. This plant, due for completion next April, will burn pulverized Utah coal. Salt Lake No. 1 will be a 60/66-mkw., 1,250-lb. 950° station located near the system load center and will cost about $10,500,000. The foundation and mat for this unit were completed last year. Steel piles, 470 in number and 10 in. in diameter, filled with reinforced concrete, were driven to a depth of 110 ft. In addition, 140 wood piles also 10 in. in diameter were driven to a depth of 75 ft. These piles are on about 4½ ft. centers and the load on them is distributed by means of a 3-ft. mat containing 2,400 cu. yd. of concrete and 340 tons of reinforcing steel. Fuel for this station will be by-product petroleum pitch supplied from a new refinery through a 4½-mile heated pipeline. Heated fuel storage will be utilized at both the refinery and the electric station.

A section, 1½ miles long, of wood-stave flowline, originally constructed at the Weber hydro plant in 1910, was replaced last year by 6-ft., 4-in. steel pipe. An existing .37-mile section of concrete pipeline at the same location

was lined with steel. Total cost of these flowline projects was about $500,000. A new diversion dam was started for the Grace hydro plant. It will be of rock-fill, timber-crib construction, 60 ft. high and 180 ft. long. This dam will submerge the present dam structure constructed in 1906 but will not disturb the present flowlines and intake works.

Transmission

Transmission activities witnessed a new 20,000-kva., 132-44-kv. transformer installed at the Riverdale substation, augmenting power supply to the important industrial center of Ogden. At Terminal substation near Salt Lake City, 132-44-kv. transformer capacity was increased by one-third. Continuation of the program to install modern high-speed oil circuit breakers at important switching points resulted in 18 new installations costing $300,000. Thirty-one miles of 44-kv. transmission lines were built. One of the important sections strengthened the interconnection with the electric facilities of the south-central part of the state and provided capacity for that area's continued industrial development. The underground system in Salt Lake received its first 44-kv. installation consisting of .64 miles of gas-filled cable and 10,000 kva. of transformer capacity.

Distribution

The distribution construction program continued at an accelerated tempo in 1949. New distribution feeders, substations and capacitors in many locations strengthened the system and provided for increased margins of safety and improved service. A new 2,000-kva. mobile substation providing voltage reduction from 44 kv. to any of the company's standard distribution voltages proved helpful in making these changes, safely and without impairment to continuity of service. This substation was used at many locations on the company's geographically large system. New rural customers were reached by 300 additional miles of line which were built at a cost of approximately $368,000.

Other construction provided a new service department building at Ogden, Utah. This project, including garages and a pole yard, cost in excess of $300,000 and will result in more efficient operation, better service to customers and better employee working conditions. The structure contains a large warehouse, meeting rooms, modern meter shop and testing facilities, spacious change and shower rooms, engineering and drafting facilities and a complete two-way radio installation.

1950 Program

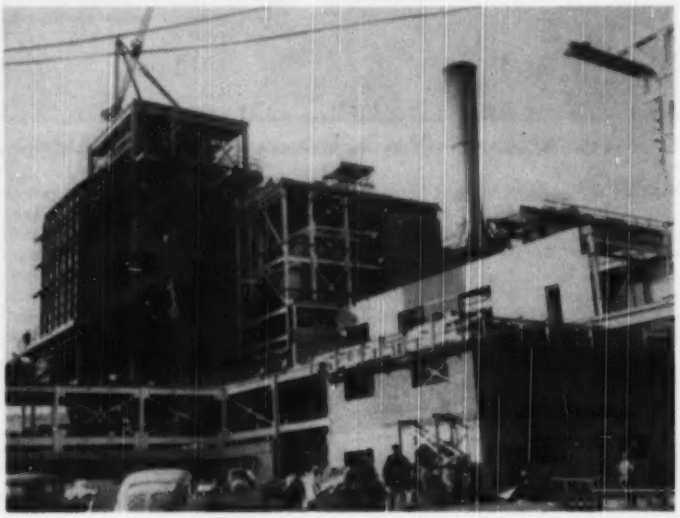
An April 1950 event of major importance and considerably ahead of schedule, will be the completion of the Orem No. 2, 40/44-mkw., steam plant. This unit will increase the steam nameplate capacity of the company system to 100,000 kw., or more than one-third of the company's total capacity. Salt Lake No. 1 steam plant will be in the very active construction stage and approximately $5 million will be expended on it during the year. Internal combustion capacity at Vernal (not on the company's interconnected system), near the center of the new Utah oil production area, will be increased by 50%. The long-range flowline replacement program will be continued and will require $500,000 this year.

Several major transmission improvement projects are planned, including $275,000 for 44-kv. expansion in the rich agricultural area of Cache Valley and about that amount to provide for increased electric demands in the Carbon-Emery coal-producing district. Service to the Salt Lake area, important as both a residential and industrial center, will be bolstered by new 44-kv. transmission lines and 132-44-kv. substation capacity. New oil circuit breakers will be installed at several locations to provide better operation, including sectionalizing.

A 132-kv. line, 23 miles in length and originating at the Oneida hydro plant, will improve service in the Montpelier area and, together with the substation, will cost $375,000. The entire 1950 program for transmission substations calls for 125,000 kva. of new capacity—a record year. One of the most interesting transmission projects might be in connection with the new atomic reactor testing station near Arco, Idaho. The Utah Power & Light Co., together with the Idaho Power Co., stand ready to furnish the power which may be required by this project. The Utah company is ready to start construction on 43 miles of 132-kv. line as soon as a contract is negotiated.

Many new substations and feeder lines to augment the company's distribution facilities will be constructed in 1950. New capacitors will be installed in accordance with a long-range study made some time ago. The company estimates that 215 miles of rural extensions will be built which will practically complete rural electrification in the company's service area.

The second new company owned service building will be completed at the American Fork division headquarters at a cost of $150,000. A new general warehouse, 100 ft. x 270 ft. on one floor, at car level height, will be constructed adjacent to the site of the Salt Lake steam plant. Located out of the congested traffic area, it will have railroad trackage the full length on one side and truck docks the full length on the other side. This warehouse is to feature unit-type storage racks and the most modern material handling equipment.—*E. M. Naughton, assistant to the vice-president.*



Orem steam plant addition, Utah Power & Light Co., has capacity of 40,000 kw.

Washington

Clark County PUD

The Clark County, Wash., Public Utility District carried on the most ambitious electrical construction program in the county's history during 1949 and completed the most vital parts of a system rehabilitation and expansion program. During the year 9.3 miles of transmission line were built north from Vancouver, Wash., to carry 66-kv. service from Bonneville Power Administration's J. D. Ross substation to the center of the county's rural area. A new 5,000-kva. substation was built to step down the power from this line.

One and eight-tenths miles of 115-kv. line were built in the Camas-Washougal area to a new 10,000-kva. substation to serve the eastern part of the county. During the first eleven months of the year installation of new and replacement transformers throughout the distribution system increased capacity 7,315 kva. Ninety-six miles of line were built, and 87 miles were converted from 2,400- to 7,200-volts wye. A total of 2,441 poles was set, including 1,751 replacements.

Customer total reached 29,000 at the end of the year, a gain of 650. This is just 99% more than ten years ago. Three-wire 220-volt service for ranges and water heaters was provided for 450 families. The average selling price per kilowatt-hour (rural and residential) was estimated at 1.16 cents for the year, and the average use per customer, 5,200 kwh.—*W. K. Billow, chief of operations.*

Columbia Basin Project, USBR

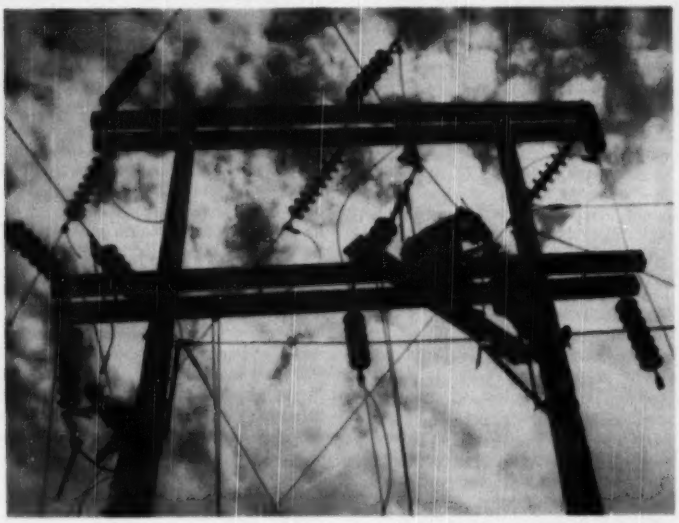
All nine of the 108,000-kw. generators in the left power house have been installed and are in operation. The installation of the first three 108,000-kw. generators in the right power house was completed during 1949, and one additional unit is currently being installed. The remaining five generators are on order. Completion of the right power house installation will represent the development of the Grand Coulee power plant's hydroelectric facilities to an ultimate capacity of 2,300,000-kw.

Construction of the Grand Coulee pumping plant is about 50% completed. Housing 12 vertical-shaft centrifugal pumps that will have a rated capacity of 1,350 cfs. each at a pumping head of 310 ft., the pumping plant will enclose the world's largest pumping installation. Contracts for six pumps and six 65,000-hp. electric motors that are to drive the pumps were awarded during 1946. Construction schedules for development of irrigation facilities call for the first two pumps to be placed in operation in May 1951.

Cowlitz County PUD

During 1949, Public Utility District No. 1 of Cowlitz County expended $800,000 for improved facilities. For 1950 there has been budgeted $650,000. Major construction for the past year consisted of rebuilding and enlarging Kelso and Castle Rock substations; the cutting over of considerable distribution line outside the cities of Kelso and Longview from 2,400 and 6,900 volts to 12,470 volts. In addition an extensive program of pole replacement and distribution reconstruction was carried out.

Our 1950 construction program is expected to be substantially of the same nature in that a new substation is planned for the Lexington area about six miles north of Kelso, and additional major substation capacity in Longview and Kelso is planned. There will be also a continuation of the pole replacement and conversion to 12,470 volts program.—*W. J. Mandley, assistant manager.*



Changeover being made in Moscow substation of Washington Water Power Co.

Puget Sound Power & Light

Operating properties in one additional county were sold to a PUD during 1949.

During the year 1949, our company will have spent approximately $6,300,000 for plant additions and improvements, $5,200,000 of which will be for the distribution accounts and $800,000 for the transmission accounts, the balance being for power stations, both steam and hydro, and for other miscellaneous accounts. Included in these improvements was the construction of eight new substations and increasing capacity of eight others, adding 95,000 kw. in substation transformer capacity. Approximately 30,000 rkva. of static capacitors were installed during the year.

Planned for 1950 is the expenditure of $5,500,000 in plant additions and improvements. Of this amount $4,200,000 is for distribution, $900,000 for transmission, and the balance is for generating stations and miscellaneous. During the year we expect to construct four new distribution substations and increase capacity of seven others, adding 90,000 kva. of transformer capacity. Also planned is the installation of 17,250 rkva. in static capacitors.—*Frank McLaughlin, president.*

Seattle City Light

For the year of 1949, total expenditures for plant improvements amounted to approximately $10,290,000, of which about $700,000 were spent on the construction of Ross Dam, which was completed to elevation 1,582 ft. above sea level, and $3,400,000 on construction for a new concrete diversion dam for Gorge power plant, a tunnel and addition to Gorge power house

to accommodate a 60,000-kva. turbogenerator, which will be installed as soon as the suppliers can make delivery, expected in 1951. Approximately $6,190,000 was expended on transmission lines and the distribution system of the department. A total of 19.7 miles of new transmission line was built, and 141,000 kva. in transformers installed. Deliveries of equipment showed an improvement over the previous year.

Number of electric meters increased to 132,000 (estimated), as compared to 127,917 at the end of 1948, or about 3.19% increase. The net system energy in 1949 decreased 2.4% under the output for 1948. The 1949 peak demand was 276,000 kw., as compared to the 1948 demand of 267,000 kw., an increase of 3.4%. This decrease is attributed to a slightly lower level of industrial activity, the bulk of the decrease being accounted for by the curtailed operations of one large customer. The annual system load factor for 1949 was 51.0%, a decrease under the 1948 load factor of 53.7%.

1950 Plans

Present plans for expansion of the department's facilities during the year 1950 include the building of 50 miles of 26-kv. and 110-kv. transmission lines; 37 miles of 230-kv. lines; the installation of some 320,000 kva. of transformers including 128,000 kva. in unit-type substations, 12,000 kva. of other distribution station transformers, and two 90,000-kva. banks or 230/115 kv. and 115/26 kv. respectively in receiving station transformers; continued construction of hydro generating facilities at the Gorge and Ross power plants. This will involve the expenditure of an estimated $18,985,000 divided into $7,805,000 for hydro generation; $6,835,000 for the transmission facilities, and $4,342,000 for distribution and other purposes.

The work outlined above is a part of an eight-year program for adding to and improving the service facilities of Seattle City Light, initiated in 1947, which is expected to involve some $50,000,000. In this program are included the installation of a 60,000-kw. turbogenerator at the Gorge hydro station, the construction of a dam in the Skagit River at the headworks of the Gorge station to replace an old log dam, and to provide an increase of 8 ft. in the head of this plant, the start of construction of Ross power house at Ross Dam, and the ordering of equipment for the installation therein of three 90,000-kw. units, with the necessary additional transmission and distribution facilities to bring the additional energy to consumers. —*E. R. Hoffman, superintendent of lighting.*

Transformer being transported to a new substation of Tacoma City Light Dept.

Seattle District, Army Engineers

Chief Joseph Dam is being constructed by the Seattle District, Corps of Engineers, primarily for the generation of hydroelectric power. As ultimately developed, the power house will contain 27 generating units. The turbines will have a capacity of about 100,000 hp. each at the rated head of 165 ft. The generators will have a rating of 64,000 kw. each, a total for 27 units of 1,728,000 kw., the second largest hydroelectric power plant in the world, exceeded only by Grand Coulee. Appropriations for fiscal year 1949 totaled $2½ million for major preliminary construction. Fiscal year 1950 appropriations total $5,000,000. Present plans indicate the dam will be completed and the first three generating units will go on the line in 1956.

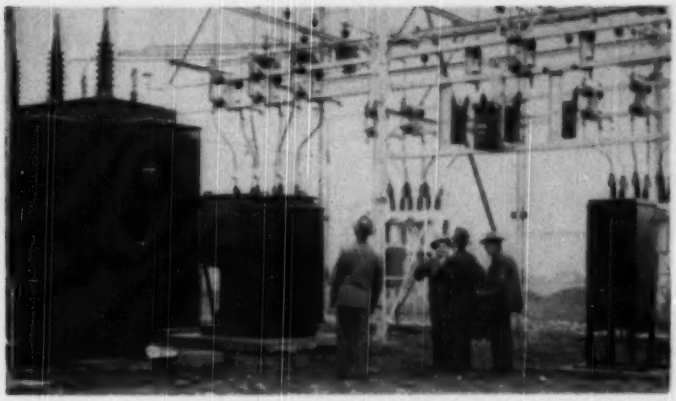
Tacoma City Light

Although the electrical load on the system of Tacoma City Light continues to grow its rate of increase has lessened. Accumulative total sales in kwh. as of November show a gain of only 4.89% as compared with 14.87% in 1948. Industrial usage has increased 3.36% and commercial 3.8% as compared with 15.71% and 8.57% respectively for the same period last year. An all-time system peak of 226,000 kw. was experienced on Jan. 3, 1950. A peak of 230,000 kw. has been predicted for January and possibly would have been realized on Jan. 3, had it not been for certain load curtailment. A long period of good weather, beginning early in the season and extending beyond the beginning of the normal, dark rainy season, coupled with the cooperative effort of industry and the public to conserve energy, but chiefly industrial curtailment due to steel and coal strikes, have been the continuing factors favoring the utility at a time when energy reserves were threatened.

The expenditure in plant accounts for 1949 totaled approximately $3,700,000 of which $150,000 went into revamping of steam plant No. 2, chiefly to provide for converting from coal burning to oil or permitting use of both. Approximately $70,000 went into hydro stations, $1.9 millions into transmission plant and $1.4 million into distribution plant. Corresponding expenditures estimated for 1950 include $20,000 for steam plants, $242,000 for hydro plants, $1.13 million for transmission plant, $847,000 for distribution, totaling approximately $2.53 million when miscellaneous accounts are included.

An additional 20,000 acre-ft. of storage capacity is to be made available in 1950 by raising the spillway gates on Alder Dam from elevation 1,200 to 1,207. Furthermore, engineering studies are being completed in contemplation of a third 37,000-kw. hydro unit at the Cushman No. 2 plant, which, it is proposed, will be in place to provide additional peaking capacity for the 1951-52 season. At Cushman No. 1 each of the two generators is to be rewound to increase rated capacity from 20,000 to 23,000 kva. at 90% power factor. A 7½% increase in energy requirements and a maximum demand of 247,000 kw. is predicted for 1950.

Tacoma still looks to its Cowlitz River development as a prime requisite for healthy economic growth. An application was made for Federal Power Commission license in 1948. The application has been perfected and a hearing by the commission on the application is expected to be held in the area early in 1950. The so-called "sanctuary" bill of the 1949 Washington State legislature barring construction on the



Battle Ground sub of Clark County Public Utility District, Vancouver, Wash.

Cowlitz River of a dam higher than 25 ft. is of course a hindrance to early plans for construction of the proposed Cowlitz River dams for which the state previously had issued permits.

The conflict between state permits, the "sanctuary" legislation, and Federal Power Commission authority to regulate use of navigable streams, and the opposition to development of the river which has resulted from the desire of sports and commercial fishing interests to preserve the fisheries resources of the Cowlitz must of course be resolved. As one means of bringing about a resolution of such conflict of authority Tacoma City Light has itself engaged competent technical consultants to undertake the design of facilities in connection with the project which will permit up and downstream migration of fish in the Cowlitz River, and provide for increasing the amount and productivity of natural spawning areas of the river and its tributaries.

Present demands of Tacoma's own industries which must be met within the next three years, would represent a large contribution to the welfare of other Northwest cities, if instead of drawing on the federal system, Tacoma City Light were permitted to proceed to develop its own future power supply on the Cowlitz River as it is ready, willing and able to do.—*J. Frank Ward, superintendent, Light Division.*

Washington Water Power

New construction and the improvement of existing facilities cost the Washington Water Power Co. $4,100,000 in 1949. Present plans call for the expenditure of slightly more than that amount in the year 1950. As part of its general rehabilitation program during the past year, the company added 45,000 kva. in substation capacity, including construction of a new substation in downtown Spokane. Named Metro, it increased capacity by 25,000 kva. A dozen other substations were further modernized; 150 miles of new distribution lines were built throughout the system in Washington and Idaho, including 65 miles of rural lines, and the rebuilding of 680 blocks to 13,000-volt operation in Spokane; 38,000 kva. of distribution transformer capacity was added. About 22 miles of 60,000-volt transmission line were reinsulated between Moscow and Lewiston, Idaho for 110,000 volts, improving service in the southern end of the WWP system. A new 110,000-volt substation was completed at north Lewiston to tie in with the Bonneville network at that point. Sections of new 110,000-volt line totaled three miles. Approximately 4,500 street light units were installed generally over the system.

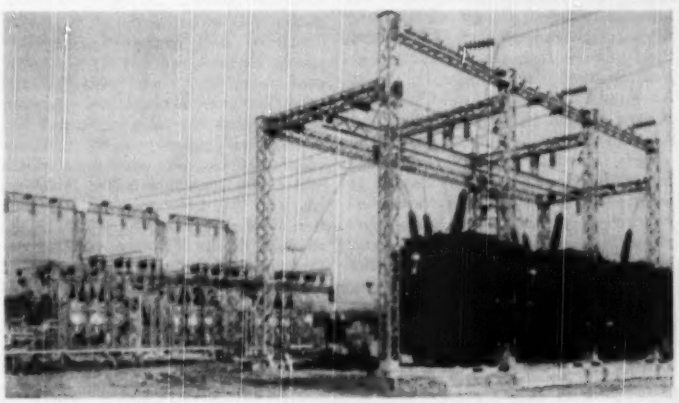
Water storage in Long Lake was increased during the year by a permanent addition of five feet atop the Long Lake dam, boosting the output of that plant about 3,200 kw., and giving the Northwest Power Pool still another 1,500 kw. through final discharge of water into the Coulee and Bonneville plants. The 5-ft. addition increased the head of Long Lake plant to 176 ft., output to 73,000 kw., and height from canyon floor to crest to 213 ft. Benefits from additional storage in Kootenay Lake in British Columbia also became effective during the 1949-50 season.

At this writing, plans for 1950 include the building of 58 miles of new 110-kv. line. Major part of this involves a new 53-mile link between Colfax, Wash., and Sunset substation in Spokane. Another 3-mile section will make direct tie with one of the 110-kv. lines from Long Lake to the north city limits of Spokane. Fifty-one miles of line will be reinsulated from 60 to 110 kv. between Post Falls, Idaho, and Newport, Wash.

Plans call for 57,500 kva. of substation transformer capacity and 55,000 kva. of distribution transformer capacity to be added. About 150 miles of distribution line will be built, including 700 blocks of rebuild in Spokane and 90 miles of rural line. Rebuild is also continuing in other parts of the WWP area, notably in the Lewiston-Clarkston area where operation will be increased from 4,000 to 13,000 volts in about 100 blocks.

Four new 110/13-kv. substations, and two from 110/60 kv., including a junction with the BPA line near Colville, will be constructed. Capacity will be increased in a few others, and the 13,000-volt section of Beacon sub will be completed in 1950. Regulator and reclosing equipment will be installed in 15 existing stations, and seven additional vaults will be installed in the Spokane underground system. About

Puget Sound Power & Light Co. installed this new substation at Bellingham



1,800 new streetlights will be installed, virtually completing a long-range modernization program of lighting for Spokane and suburban communities. *—J. E. E. Royer, vice-president and general manager.*

Wyoming

Missouri River Basin Project, USBR

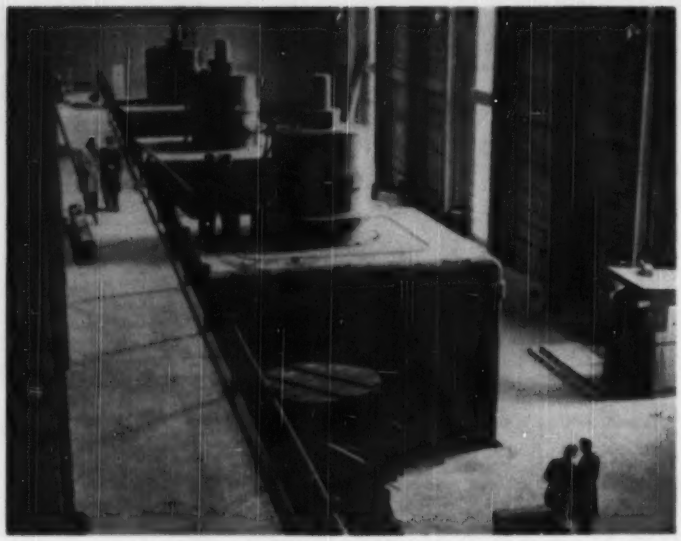
Construction of Kortes Dam and power plant is about 80% completed. The power plant is to accommodate three main 12,000-kw. generating units. Current plans call for the generation of initial power by June 1950. Boysen Dam and power plant, which is to house two main 7,500-kva. generating units, is about 65% completed. Canyon Ferry Dam and power plant were placed under construction in May. The power installation consists of three main 18,750-kva. generating units.

Transmission lines for the project include the Gering-Sidney 115-kv. line, work on which is nearing completion; the Sterling-Sidney 115-kv. line, construction of which was recently completed; the Fort Randall-O'Neill 115-kv. line, which was placed under construction in August; and the Casper-Gering 115-kv. line, which is about 80% completed. Calls for bids are expected to be issued soon for construction of the 38-mile Jamestown-Edgeley 115-kv. line and the 70-mile Edgeley-Forman 69-kv. line.

Construction Bids

Invitations are to be issued early this year for construction of the following transmission lines: Seminoe-Sinclair, 115-kv., 34 miles; Carrington-Jamestown, 115-kv., 52 miles; Devils Lake-Carrington, 115-kv., 50 miles; Bismarck-Devaul, 69-kv., 41 miles; Rugby-Devils Lake, 115-kv., 61 miles; Voltaire-Rugby line, 115-kv., 56 miles; Sterling-Ogallala, 115-kv., 88 miles; Boysen-Alcova, 115-kv., 100 miles, and Alliance-Chadron, 115-kv., 55 miles.

Bids for construction of the following transmission lines are expected to be invited this spring: Voltaire-Garrison, 115-kv., 55 miles long; Garrison-Bismarck, 230-kv., 65 miles long, and Bismarck-Jamestown, 230-kv., 105 miles long. In May, specifications are expected to be issued for construction of Jamestown-Valley City, 115-kv., 37-mile-long transmission line and the Devils Lake-Lakota, 115-kv., 27-mile-long line.



Six-nozzle, 62,000-hp. water wheels operating under 1,118-ft. head at Bridge River plant of British Columbia Electric Ry Co. develop an efficiency of 93%

Hawaii

Hawaiian Electric

During 1949, $4,100,000 was spent for new facilities by the Hawaiian Electric Co., Ltd. Budgeted for 1950 is $5,500,000.

The second 44-kv. circuit of the Koolau to Wailupe line was completed. This project consisted of installing nine miles of 4/0 copper conductors over a 2,500-ft. high mountain range. The longest span was 4,250 ft. with a difference of 1,685 ft. in elevation between supports. Three new 1,500/1,875-kva., 44/4-kv. and one 2,000-kva. 11/4-kv., CSP unit-type substations were installed. One new 3,000/3,916-kva., 44/4-kw. unit substation was also added to the system. The third 11-kv. feeder from Honolulu generating station to the city underground network was installed and nine 500-kva. network transformers were added to this system. The distribution system of the Kahuku Plantation Co. was purchased, which added 500 customers to the Hawaiian Electric Co. Ltd., system. Construction of the 40,000-kw. addition to the capacity of the Waiau generating station proceeded during the year. The steel and concrete addition to the plant was nearing completion and erection had started on the boiler.

The plans for 1950 consist of the completion of the 40,000-kw. addition to the Waiau station, building eleven miles of 44-kv. transmission line from this station to the Koolau switching station, installing new substation transformers of 22,716 kva. in new or existing substations, and installing the fourth 11-kv. network feeder and ten 500-kva. network transformers.—*L. A. Buese, chief engineer.*

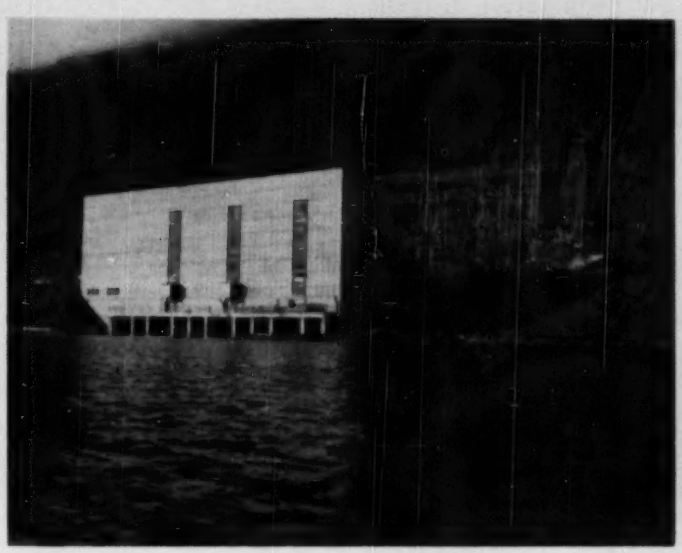
Canada

B.C. Electric

1949 was an active year in all phases of construction, more than $18,000,000 having been spent for new electrical facilities on the B. C. Electric's lower mainland system. In the generating field, two additional 62,000-hp. units were brought into service at Bridge River, one in May and one in early December making a total of 186,000 hp. in service and completing the first stage of this 600,000-hp. development. To provide for necessary year-round operation of this plant, a storage dam is under construction at La Joie Falls, approximately 35 miles above the intake.

Hydro Additions

Work has also been undertaken during 1949 on installation of an additional 47,000-hp. unit at the existing Ruskin plant on the Stave River, some 30 miles east of Vancouver. This unit involves extending the power house



Bridge River plant (left) of British Columbia Electric Ry. Co. has installed two of an ultimate of ten 45,000-kw. units. Another unit is under construction. At right, span in the Koolau-Wailupe 44-kv. line of Hawaiian Electric Co.

and driving a penstock tunnel approximately 500-ft. long to carry water from above the existing dam. It will be ready for service in the autumn of 1950. It will increase the capacity of the Ruskin plant for peaking purposes to 141,000 hp. Investigation of further power projects for development in succeeding years is also under way.

Load growth has continued at a steady rate—the peak hourly load for the system during December 1949 was 279,000 kw., compared with 240,000 kw. in 1948. In addition, since July 1948, 30,000 kw. have been exported under contract to member companies of the Northwest Power Pool in Washington and Oregon.

Substation Expansion

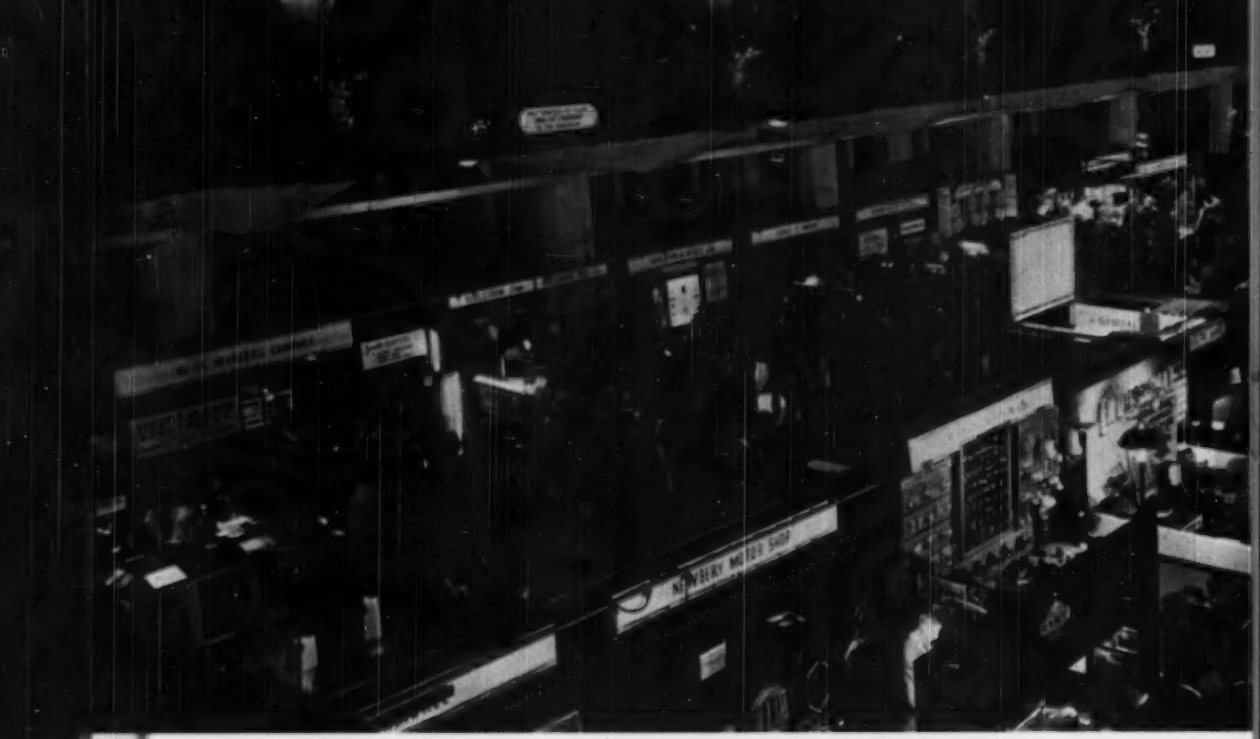
Substation facilities have also been expanded to meet the growing load conditions. At Horne-Payne, the receiving station for Bridge River power, the second 66-mva., 3-phase, 3-winding receiving transformer was installed together with a 30-mva. synchronous condenser as well as 60-kv. ring bus facilities to connect with the subtransmission system. As a further link in this subtransmission system, a second 60-kv. underground cable circuit was brought into service between Murrin and Horne-Payne substations. This, like the former installations, is comprised of three single-conductor oil-filled cables, the distance being approximately 4.4 miles. As part of the plan for the subtransmission ring around the metropolitan area, two 60-kv. circuits from Stave Falls generating station were diverted from Horne-Payne to Burnaby substation. The ring is extended eastward as it will be in 1950 by construction of the first stage of a new ring distribution station on the eastern border of Burnaby municipality.

In the Fraser Valley, two new substations were brought into service, one in North Surrey and one in Sumas municipality. The stations are equipped with one 3,000-kva., 3-phase transformer with provision for a second to serve the 6.9/12-kv. common neutral distribution system being constructed in the Fraser Valley. In addition, a second 3,000-kva. transformer was installed in Chilliwack station where the initial unit went into service in 1948.

Service was extended to new areas, at Squamish and at Bowen Island. Squamish, the western terminus of the Pacific Great Eastern Railway, was reached by construction of a 34-kv. line from Britannia, a distance of approximately nine miles. Service to Bowen Island in Howe Sound was accomplished by means of a submarine cable installation operating at 112 kv., the length of submarine circuit involved being approximately 16,000 ft.

In supplying power for transportation services two 1,500-kw. automatic rectifier units were put into service at Haro Street substation in place of manually operated synchronous converter units.

Following are the major items of new construction in a $12,000,000 budget scheduled for service in 1950. The additional 47,000-hp. hydro generating unit at Ruskin has already been referred to. In distribution substations, additional transformer capacity of 25 mva. at Murrin and 7.5 mva. at Royal, installations formerly scheduled for 1949, will be put into service during the first half of the year. At the new Sperling substation in West Point Grey, two 15/20-mva. transformers will be installed in 1950 together with switching facilities to serve twelve 4-kv. circuits and 60-kv. primary switching to connect this station with the subtransmission ring. A 15-mva. transformer bank also will be installed in east Burnaby at the site of the new major ring station already referred to. In the Fraser Valley, one new station will be built of similar type to those already in service and the capacity of other stations will be increased. For transportation power supply, a rectifier installation of four 1,500-kw. units of glass-bulb type is being made in Murrin Annex station replacing obsolete rotating equipment. One new station to house a similar 1,500-kw. unit, with provision for a second will be constructed in the West Point Grey area. Two further similar rectifiers will be installed to replace manually operated units in two other stations. Three additional street car routes are scheduled for conversion to trolley coach operation and one existing coach line will be extended.—*T. Ingledow, vice-president and chief engineer.*



WHAT'S *YOUR* INTEREST IN THE

Yes, there will be a million and a quarter dollars per day for the 365 days of 1950 spent on appliances, wiring, lighting, commercial and industrial electric equipment in the eleven Western States. How is this figured?

All utilities, private and government, estimate a load increase of 750,000 kw. Of this, 20%, or 150,000 kw., will go to serve new domestic load. Average demand on the peak of one residential customer is 500 watts. Hence each kw. represents two new residence customers, or 300,000 total.

Each average house of six rooms costs about $300 to wire, of which 60% is labor. Materials and fixtures run about $160 per house. Appliances at retail, even without range and water heater, average $625 per house. Thus for 300,000 at $785 per house there's $235,000,000.

Commercial lighting and commercial usage will take another 20% or 150,000 kw. Average customer investment per kw. in commercial lighting and wiring is $500. Hence a market for $75,000,000 in this field.

Industrial increase, utilities estimate, will take another 20%, or 150,000 kw. (This does not include large industrials, railroads, street lighting, etc.) For each kw. of peak demand there is required about $1,000 of customer equipment and wiring, or a total of $150,000,000.

This makes a grand total of $460,000,000 in wiring, appliances, lighting, commercial equipment and industrial equipment to be sold in 1950—more than 1¼ million per day.

Apply these percentages to your local utility's program and cut yourself a slice of this pie by strong selling in 1950. That's the opportunity.

WHAT will selling be like in 1950? That question pops up in the minds of all who have things to sell—*electricity* by the *utility; appliances* by the *dealer; wiring materials, labor* and *services* by the *contractor; supplies* by the *distributor; materials, equipment, apparatus, appliances,* by the *manufacturer; engineering design* by *engineers* and *architects.*

Will there be electricity aplenty to sell?

What's to be done about selling it—so that you may tie on to promotions and programs and build more business.

Answers to these and similar questions have been sought for you from the utilities of the West. This includes the private, municipal, PUD and REA cooperatives as far as possible. (Some of the latter are so new that they have not yet given any attention to load building or to statistics useful to the industry). Both ELECTRICAL WEST and *Electrical Merchandising* have asked these utilities for answers to a number of pertinent questions.

Answers are classified as to *availability of power supply,* which means a freedom to sell and promote with an assurance of the customer being

$1¼ MILLION PER DAY MARKET?

The figures give you something to measure your own by; they show you the way the market is going; what and where the opportunities are; what help you'll get in the way of local utility sales programs and promotions

served; *load building*, which indicates what campaigns and promotions the utility will participate in to help develop the market for you; *wiring*, which means blazing the trail for future acceptance of electric usages by helping to sell more wiring now; *commercial and industrial programs*, which tell the extent to which these utilities will go in developing new lighting and other business for the industry; *agricultural programs*, which plant seeds for farm electrical usage and equipment that will grow into future business; *industrial development*, which tells of efforts to bring new industries and pay rolls to your trading area; *new projects* affecting business conditions, in other words new developments in the area which have a bearing on the business outlook.

These facts and figures, some of them in tables, can be part of the background for your own company plans. Smart business strategy makes use of such sales intelligence for its own campaign for business and profit.

Outstanding example of cooperation between groups in the industry to promote electrical equipment and applications is the Industrial Electrical Show, staged annually by the Electrical Maintenance Engineers Assn. of Southern California, whose last show is pictured above. Another in March

Accomplishments in 1949 are also reported in accompanying tables. Since most estimates say that 1950 sales will equal those in 1949 the figures can be taken as a potential at which to shoot. Competition for that volume will be even keener than in 1949. Strike-caused shortages have now disappeared and products will be in abundance. In fact, factories will be putting pressure on distributors and dealers to absorb and sell more. It is only by keeping factories rolling that prices can be maintained or reduced.

Population—it keeps moving West, which increases the market. Over-all increase reported by 67 utilities, representing 4,690,500 domestic customers in eleven Western states, British Columbia and Hawaii, is about 5%.

Kilowatt-hour consumption per domestic customer is an index of electric acceptance and saturation of appliances, as well as a measure of the replacement market. Again the West is high in these averages. Highest, possibly in the entire U. S. is 10,408, reported by Southern Nevada Power Co. at Las Vegas, Nev. Next come Tacoma with 6,400, Eugene 5,800, Seattle 5,286, Portland General Electric Co. 5,050, Washington Water Power 5,040, and many over 4,000.

Saturations — which should be regarded not as a sold out market but as an indication of local acceptance and in terms of opportunity for replacement sales — are also high. The tables can be studied with profit on that score.

Instead of a complex report on each utility's answers on all questions, the material that follows is arranged by subjects and what is being done on each by the respective utilities is briefed.

Electricity for Sale?

Are power supplies ample so that dealers can sell all the equipment they want to in 1950 without fear that their customers may not get electricity to operate it? Answers to that question have been very important to many in the industry during the past two years.

In general, the answer is that the power situation, except in the Pacific Northwest, is much better than last year. There will be power to sell everywhere in the West except in Washington and Oregon.

The specific situation with each utility is reported as follows:

Alameda Bureau of Electricity—No curtailments; in position to accept any load.

Anaheim Light, Power & Water Dept.—Adequate for the present.

British Columbia Electric Railway Co.—Power supply ample. Full load-building activities under way. Two additional units, 62,000 hp. each, of our Bridge River system have been brought into service during 1949 making ample power available for all requirements. We are extremely fortunate in being one of the few companies on the West Coast that is in this enviable position, even including some power from our system going south of the line into the Northwest Power Pool. The same situation prevails for the Victoria system.

Burbank Public Service Dept.—Recently installed new generating capacity also.

California Electric Power Co.—Reports power supply situation O.K.

California Oregon Power Co.—No general load-building program will be considered at present.

California Pacific Utilities Co.—Excellent. We have power for sale and will be able to supply all domestic and commercial loads promptly. Industrial loads can be supplied as soon as equipment can be procured and installed.

Central Arizona Light & Power Co.—Plenty of power available.

Coast Counties Gas & Electric Co.—Electric power served is purchased from Pacific Gas and Electric Co. (whose situation is greatly improved also).

City of Colorado Springs—O.K.

Ely Light & Power Co.—Our supply situation is good.

Eugene Water & Electric Board—Power supply appears adequate this year due to recent rains.

Frontier Power Co., Trinidad, Colo.—No shortage.

Glendale Public Service Dept.—No curtailment or restrictions. Plenty of capacity.

Hawaiian Electric Co. — Ample power supply.

Hilo Electric Light Co.—O.K. for present.

Idaho Power Co.—Present and future capacity ample for present and all future residential farm, commercial and industrial needs.

Imperial Irrigation District—Additional generating units either under construction or definitely scheduled for construction will provide ample capacity for future growth.

Los Angeles Department of Water & Power—The department continues to have ample power supply—no influence on load building.

Modesto Irrigation District — Adequate for anticipated increases in load.

Montana-Dakota Utilities Co., Sheridan, Wyo. — Sufficient capacity at present — possible increased capacity to be installed by 1951—7,500 kw.

Montana Power Co.—Favorable; no power shortage.

Mountain States Power Co., Albany, Ore. — Until such time as federal power projects under construction are completed, there is little need for load-building promotion because the power supply may become inadequate during peak periods.

Pacific Gas and Electric Co.—Reserves improving and will continue to improve in 1950 and 1951; now approximately 10%; all business being served.

Pacific Power & Light Co.—Seasonal shortages possible for the next few years and the company sales program necessarily is tailored to the situation.

Pasadena Municipal Light & Power Dept.—Adequate.

Portland General Electric Co.—We accept new loads, except for electric space heating and new or additional new loads which exceed 500 kw. of demand. These exceptions were adopted by the Northwest Utilities Conference Committee, which is composed of all members of the Northwest Power Pool.

Public Service Co. of Colorado—Power supply adequate to encourage and meet most any type of load building program.

Public Service Co. of New Mexico, Deming—Ample.

Puget Sound Power & Light Co.—Power supply in Pacific Northwest still inadequate; therefore it places a limit on any immediate load building.

Raton Public Service Co., New Mexico—Good.

Riverside Electric Light Dept.—Very good.

Sacramento Municipal Utility District—Indications are that supply will be adequate unless season is unusually dry.

Salt River Valley Water Users Assn.—Limited.

San Diego Gas & Electric Co.—Power supply is now adequate with assurance of additional capacity in 1950. We will continue our load building program.

Seattle City Light—Power development by City Light has always been in stride with growth of use of electricity.

Sierra Pacific Power Co.—Power supply is ample for all load building.

Southern California Edison Co. — Adequate supply of power.

Southern Colorado Power Co., Pueblo—Good shape.

Southern Utah Power Co., Cedar City—Good.

Southwestern Public Service Co., Roswell, N. M.—15,000-kw. generator now being installed at Roswell plant. Until completion present power supply somewhat limited.

Tacoma Department of Utilities—Tacoma is a member of the Northwest Power Pool and Northwest Utility Conference Committee. Plans for area-wide curtailment formulated, but improved stream flow conditions have lessened the need for curtailment.

Telluride Power Co.—Adequate.

Utah Power & Light Co. and *Western Colorado Power Co.*—Satisfactory.

Washington Water Power Co. — Power situation is too critical to permit promotion of load. All programs point to customer relations and a maintenance of present loads.

Sales Promotion Plans

Whether each utility plans to do direct merchandising or not is indicated in an accompanying table which also shows the estimated number of dealers now and prewar. Another table computes the number of customers per dealer by states from the available figures. Saturations estimated for various appliances are to be found in the table giving estimates of the number sold in 1949. Some companies have very accurate figures for all of these because they maintain a dealer report system which totals appliance sales and reports to dealers the volume of each sold in their communities and for the system—a valuable selling gauge to the industry. Others have made estimates based on observation and some consultation with dealers and distributors.

Whether campaigns or promotions are felt to be needed and what programs the utilities plan to pursue, as well as what resistance and problems they feel are being experienced at present are briefed in the following excerpts from the questionnaire answers:

Alameda Bureau of Electricity—Campaigns are needed and always use-

ful, reports G. A. Baxter, secretary. Newspaper advertising will be used. Consumer resistance to appliance prices evident. Face merchandising problem of installation costs.

Anaheim Light, Power & Water Dept.—No campaigns are needed and none are planned, says V. W. Hannum, superintendent. Price resistance is evident. Trade-ins, credit and customer resistance are merchandising problems in the area.

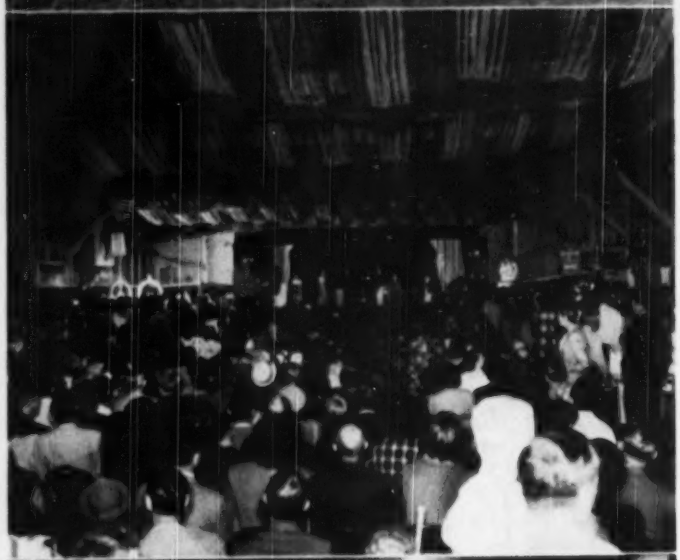
Arizona Edison Co.—The need for campaigns is apparent, according to V. A. Pierce, personnel director. Will promote home freezers. Price resistance is evident. Dealer inactivity, shortage of salesmen, installation costs and customer resistance are major merchandising problems.

British Columbia Electric Railway, Vancouver—Our major load-building promotions for 1950 will be cooking and electric water heating and home laundry, which will include washer, ironer, dryer and storage water heater, reports J. H. Taylor, customer services manager. Although consumer resistance to prices is not evident, the present currency exchange situation

Customers and Consumption

Utility Territory	Average Annual Kwh. Consumption — Residential					Customers — Domestic Customers		Commercial Customers		Total Customers	
	1949	1948	1947	1946	1945	1949	1948	1949	1948	1949	1948
Alameda P.U. Dept.	1,624	1,556	2,625	1,480	1,416	17,975	12,750	1,842	1,853	14,870	14,603
Anaheim L. & W. Dept.	1,000	1,000	1,000		750	4,250	4,065	1,045	1,037	5,295	5,092
Arizona Edison	1,900	890		1,100		18,838	17,702				
Ashland Mun. L. & P.		3,960									
B.C. Electric Ry., Vancouver	2,056	1,810	1,450	1,318	1,089	148,500	141,502	24,300	22,362	172,800*	163,864*
B.C. Electric Ry., Victoria	1,530	1,500	1,425	1,336	1,218	31,274	29,539	6,246	6,020	37,520	35,559
Burbank P.S. Dept.	1,732	1,591	1,550			24,259	22,815				
Caliente P.U.	4,000					327	315				
Calif. Elec. Power	1,840	1,720	1,450	1,476		38,870	33,800				
Calif. Oregon Power	4,700	3,975	3,590	3,228	2,886	54,400	51,219	12,454	11,763	66,854	62,982
Calif. Pacific Utilities	2,950	2,540	2,240	1,760	1,664	17,910	17,331	4,102	4,019	22,093	21,402
Central Ariz. L. & P.	1,950	1,811	1,689	1,569	1,452	54,741	51,490	9,973	9,401	65,565	61,733
Cheyenne L. Fuel & P.	1,800	1,505	1,500	1,400		11,600	8,200				
Coast Counties G. & E.	1,710	1,461	1,450	1,250		32,586	30,847	5,500	4,968	42,807	38,534
Colorado Central Power		1,400									
Colorado Springs P.U. Dept.	1,500		1,325	1,092	1,190	16,690	15,825	4,000	3,852	20,690	19,677
Colorado Utilities	1,350					1,760	1,747				
El Paso Elec.	1,830	1,680	1,610	1,557	1,445	40,800	38,456				
Ely L. & P.	1,337	950	892			1,265	1,269	314	305	1,579	1,574
Eugene Water & Electric	5,800	5,200	5,000	4,400	3,800	15,700	14,632	2,400	2,217	18,100	16,849
Fort Collins L. & P. Dept.	1,586	1,510				4,644	4,544				
Frontier Power	950	880	896	761		4,200**	7,063	700**	1,200	4,900**	8,253
Glendale P.S. Dept.	1,500	1,500	1,600	1,400	1,320	31,500	30,505	6,600	6,435	38,100	36,940
Grays Harbor PUD No. 1	3,746	2,301	2,593	1,800		15,450	13,979	3,069	2,900	18,775	17,143
Hawaiian Elec.	2,570	2,400	2,125	1,932	1,791	59,869	55,825	13,796‡	13,060‡	73,665	68,885
Heber L. & P.	2,600		1,600			1,100	1,070				
Helper City Mun.		1,500									
Hilo Elec. Light	1,618	1,400				10,542	10,343	2,486	2,230	13,409	12,883
Home G. & E.		2,020									
Idaho Falls Elec. Light			5,600								
Idaho Power	4,250	3,815	3,400	2,900	2,550	93,000	88,217	13,702	13,175	106,702	101,392
Imperial Irrig. Dist.	3,500	3,400	2,400			19,800	18,727	3,820	3,638	25,400	24,138
Logan, City of	1,600	2,540			2,334	4,800	4,515				
Los Angeles Dept. W. & P.	1,648	1,505	1,470	1,375	1,220	549,000	525,000	115,200	111,268	672,000	645,469
Modesto Irrig. Dist.	2,400	2,400	2,500		2,250	15,623	14,816	3,312	3,215	18,935	18,031
Montana-Dakota Util.	1,465					4,889	4,657				
Montana Power	1,955	1,670	1,469	1,325	1,165	97,300	93,804	14,875	14,358	114,670	110,500
Mountain States Power	3,375	3,000	2,700	2,100	1,875	84,500	81,637	12,250	11,729	102,000	98,057
Murray, City P. & L.						3,302	3,062				
Pacific G. & E.	1,830	1,620	1,607	1,495	1,345	1,001,300	951,741	212,380‡	206,140‡	1,267,400	1,208,579
Pacific P. & L.	4,355	3,920	3,700	2,673	2,150	115,444	110,877	22,520	21,114	139,530	133,874
Palo Alto, City of	1,639	1,500				7,476‡	7,157‡				
Pasadena L. & P. Dept.	1,635	1,590	1,515	1,380	1,280	34,263	33,352	4,280	3,920	38,543	37,273
Payson Mun. System	1,200	2,500				1,500	1,380				
Portland Gen. Elec.	5,004	4,553	3,800	3,197	2,633	174,574	165,859	20,148‡	19,390‡	196,403	186,869
Price Light Dept.		3,600									
Provo P.U. Dept.	2,498	2,000	1,712	2,412		6,845	6,369				
P.S. of Colo.	1,423	1,350	1,219	1,087	975	147,951	140,421	24,341	23,238	192,060	181,736
P.S. of N.M. (Albuquerque)	1,104	1,092	1,000	900		42,723	38,078				
P.S. of N.M. (Deming)	1,063	1,044	968	885		1,536	1,434	759	693	2,295	2,127
P.S. of N.M. (Las Vegas)	1,110	1,020	908	830		2,780	2,500				
P.S. of N.M. (Santa Fe)	1,060	960	780	880		6,500	6,100				
Puget Sound P. & L.	4,310	3,840	5,150	2,660	2,685	205,000‡	231,170	24,000‡	27,000	229,000‡	258,170
Raton Public Service	1,915	1,676			1,038	2,089	1,989	389	371	1,700	1,618
Rawlins Elec. Co.	1,440					2,483	2,219				
Riverside L. Dept.	1,500	1,620	1,416	1,800	1,260	13,935	13,391	1,690	1,610	15,625	15,001
Sacramento MUD	2,055	1,885	1,838			66,450	63,558	10,750	10,518	80,600	77,465
Salt River Valley Water Users	5,000	3,200	2,900	2,200		18,400	15,901	750	700	19,150	16,600
San Diego G. & E.	1,857	1,647	1,541	1,444	1,337	139,457	132,657	23,593	22,689	170,250	162,566
Seattle City Light	5,212	5,070	4,525	4,099	3,556	100,812	98,098	15,819	15,293	116,658	113,420
Sierra Pacific Power	3,300	2,869	2,800	2,520	2,257	20,750	19,362	3,650	3,555	24,400	22,917
So. Calif. Edison	1,495	1,382	1,400		1,216	727,000	680,000	160,600	154,730	887,600	834,700
So. Colorado Power	1,590	1,510	1,409	1,300	1,148	28,400	27,777				
So. Nevada Power	10,408	8,253	6,800	5,616	4,580	8,549	7,720				
So. Utah Power	2,048	6,000				4,560	3,590	650	582	5,400	4,325
So. Wyoming Util.	1,180					4,920	4,850				
Southwestern P.S.	1,250	1,085				14,333	13,610	3,859	3,645	18,192	17,255
Spanish Fork Mun.						1,500	1,393				
Springville Mun.	2,100	2,520				1,900	1,800				
Tacoma City Light	6,200	5,700	5,100	4,500	4,178	45,000	43,409	5,400	5,185	51,800	49,824
Telluride Power	2,000	1,776	1,000	810	850	6,650	6,495	606	560	7,256	7,045
Tucson G. E. L. & P.	1,670	1,617	1,560	1,431	1,275	30,625	28,792				
Turlock Irrig. Dist.	3,080					12,700	11,687				
Uintah P. & L.		2,350		729	925						
Utah P. & L.	2,548	2,314	1,996	1,770	1,559	145,577	140,524	15,647	15,267	163,984	158,578
Washington Water Power	5,144	4,709	4,201	3,767	3,168	80,519	77,758	17,100	16,641	111,350	107,892
Western P.S. Co.	1,360	1,234	1,300			3,800	3,598				

† Loss of properties to PUDs. ‡ Includes industrial customers. * Not including power customers. ** Decrease due to loss of Trinidad to municipal operation. § For one year, from June to June.



may alter this so far as appliances made in the United States and imported to Canada are concerned. Price cutting is apparent to a small degree in the form of special deals; there is a noticeable shortage of trained salesmen; installation costs are an increasing problem; trade-ins are noticeable, particularly on radios and washers, and to a limited extent on ranges. One of the major problems is the diversification of the many retailers handling appliances. There is no noticeable trend yet for those who during the war years diversified their appliance business to again become strictly appliance dealers.

British Columbia Electric Railway, Victoria—We have an electric water heater campaign in progress now, says A. W. J. Smith, customer service manager, and foresee the need for campaigns to build load in the future. Price resistance is not evident. Shortage of salesmen and installation costs are problems in the area.

Burbank Public Service Dept.—Specific campaigns on electric ranges, water heaters and home freezers are planned, according to H. McComas, new business agent. Merchandising problems are dealer inactivity, manufacturers' price changes and customer resistance.

Caliente Public Utilities—No promotions are needed or planned. Consumer resistance to prices is evident. Manufacturers' prices changes and customer resistance are major merchandising problems in the area.

California Electric Power Co.—Electric ranges and water heaters will be promoted, reports J. G. Neal, merchandising manager. Dealer inactivity, dealers dropping out, price cutting, shortage of salesmen and customer resistance are all major problems.

California Oregon Power Co.—Home freezers will be promoted, says D. A. Runyard, sales manager. Price resistance is apparent. Only merchandising problem is shortage of salesmen.

Back in the 1900 era, Washington Water Power Co. promoted electric ranges by taking them out for field demonstrations on hard-tired, chain-drive trucks over dirt roads. The same showmanship today brings hundreds to cooking schools and expositions like the Farm & Home Electrical Exposition last April at Grand Junction, Colo., where 20 dealers displayed appliances around the hall and demonstrations of freezers, ranges and small appliances by Public Service Co. of Colorado home economists drew crowds of 1,500, afternoons, 5,000, evenings. Today every live dealer's store makes his window a showplace, as does O. S. Stapley Co., Phoenix, Ariz., at the left

The Appliance Sales Force

Utility Territory (Dealer Association or Cooperative League in the Area—in Parenthesis)	Whether Itself 1949	Utility Merchandises 1950	Dealers Present Number	Dealers Number Prewar
Alameda P.U. Dept.	N	N	8	4
Anaheim L. & W. Dept.	N	N	15	10
Arizona Edison	N	N	70	40
B.C. Elec. Ry. (Vancouver) (B.C. Div. Can. Assn. Radio & Appl.)	N	N	250	125
B.C. Elec. Ry. (Victoria) (Dealers Div. Dept. & Leagues)	N	N	59	16
Burbank P.S. Dept. (Burbank Elec. Appl. Dlrs. Assn)	N	N	21	10
Caliente P.U.	N	N	3	3
Calif. Elec. Power	Y	L	150	50
Calif. Oregon Power	N	N	175	150
Calif. Pacific Util.	N	N	105	63
Central Ariz. L. & P.	N	N	118	60
Cheyenne L. Fuel & P.	Y	Y	36	7
Coast Counties G. & E. (NARDA)	Y	N	82	60
Colorado Central Power				
Colorado Springs P.U. Dept.	N	N	25	15
Colorado Utilities	N	N		
El Paso Electric	Y	Y	127	31
Ely L. & P.	N	N	8	7
Eugene Water & Elec.	N	N	20	15
Fort Collins L. & P. Dept.	N	N	21	15
Frontier Power	N	N	25	11
Glendale P.S. Dept.	N	N	60	11
Grays Harbor PUD No. 1	N	N		
Hawaiian Elec.	Y	Y		
Heber L. & P.	N	N	6	4
Hilo Elec. Light	Y	N	15	5
Idaho Power	Y	Y	600	400
Logan, City of	N	N		
Los Angeles Dept. of W. & P. (Elec. League of L. A.)	N	N	460	180
Modesto Irrig. Dist.	N	N	35	20
Montana-Dakota Util.	Y	Y	20	10
Montana Power	N	N	425	350
Mountain States Power	N	N	210	175
Murray, City P. & L.	N	N		
Pacific G. & E. (No. Calif. Elect. Bur.)	N	N	2,294	1,321
Pacific Power & Light (N.W. Appl. Ret. Assn.)	N	N	500	400
Palo Alto, City of	N	N		
Pasadena L. & P. Dept. (Pasadena Radio & Elect. Dlrs. Assn.)	N	N	40	30
Payson Mun. System	N	N	6	3
Portland Gen. Elec. (N.W. Appl. Ret. Assn.)	N	N	385	200
Provo P.U. Dept. (Intermt. Elect. Assn.)	N	N		
P.S. of Colo. (Rocky Mt. Elect. League)	Y	L		
P.S. of N.M. (Albuquerque)	N	N		
P.S. of N.M. (Deming)	N	N	7	5
P.S. of N.M. (Las Vegas)	N	N		5
P.S. of N.M. (Santa Fe)	N	N	14	7
Puget Sound P. & L.	N	N	750	500
Raton Public Service	N	N		
Rawlins Elec. Co.	Y	Y	8	7
Riverside L. Dept.	N	N	21	
Sacramento Mun. Util. Dist. (Sacramento Elec. Club)	N	N	120	120
Salt River Valley Water Users	N	N		
San Diego G. & E. (Bur. Radio & Elect. Appl.)	N	N	450	250
Seattle City Light (Assn. Appl. Dlrs.)	N	L		
Sierra Pacific Power	N	N	100	65
So. Calif. Edison	N	N	800	350
So. Colo. Power (NARDA & Rocky Mt. Elect. League)	Y	Y	39	25
So. Nevada Power	N	N	22	8
So. Wyoming Util.	N	N	8	8
Southwestern P.S.	N	N	14	
Spanish Fork Mun.	N	N	13	10
Springville Mun.	N	N	9	6
Tacoma City Light (Tacoma Appl. Ret. Assn.)	N	?		
Telluride Power (Intermt. Elect. Assn.)	N	N	48	14
Tucson G. E. L. & P.	N	N	35	18
Turlock Irrig. Dist.	Y	Y		
Utah P. & L. (Intermt. Elect. Assn.)	N	N	1,812	450
Washington Water Power (Inland Emp. Elect. Dlrs. Assn.)	N	N	370	290
Western P.S. Co.	Y	Y	15	8

Y = Yes N = No L = Limited to a few load building appliances.

California-Pacific Utilities—We feel campaigns are needed and will promote electric ranges and water heaters, says E. A. Nickelsen, commercial manager. Consumer resistance to prices is evident. Major problems are dealer inactivity, shortage of salesmen and customer resistance.

Central Arizona Light & Power Co.—Planning promotions on electric ranges, water heaters, home freezers and dryers, according to A. W. Smith, sales promotion and advertising manager. Consumers are price conscious and resistance is evident. A shortage of salesmen and the fact that salesmen don't know how to sell are problems in the area.

Cheyenne Light, Fuel & Power Co.—We foresee the need for campaigns for load building and at present have promotions planned on electric ranges, water heaters and home freezers, says W. B. Petch, commercial manager. On top priced items consumer resistance is apparent. Dealer inactivity, price cutting, shortage of good salesmen and the current strike situation in the country are holding up sales.

Coast Counties Gas & Electric Co.—Campaigns are needed and planned on electric ranges, water heaters and home freezers, according to R. L. Hayden, vice-president. Price resistance is apparent. Problems include dealer inactivity, shortage of salesmen, installation costs, trade-ins and customer resistance.

Colorado Springs Public Utilities Dept.—Some promotional effort must be made at all times to build load, reports H. A. Galligan, commercial manager. Price resistance not noticeable. Installations costs and customer resistance are problems.

Colorado Utilities Corp.—No campaigns needed or planned.

El Paso Electric Co.—Campaigns needed and planned on electric ranges, water heaters and home freezers, according to H. A. Walsh, new business manager. Price resistance is evident. Problems include dealer inactivity, shortage of salesmen, installation costs and customer resistance.

Ely Light & Power Co.—We will promote electric ranges, water heaters, home freezers and dryers, says Thomas A. Smith, manager.

Eugene Water & Electric Board—No campaigns are planned. Consumer resistance is not evident, Harold H. King, assistant secretary, reports.

Fort Collins Light & Power Dept.—Will run campaigns on electric ranges, water heaters, home freezers and dryers, says Richard S. Baker, assistant manager of utilities. Price resistance is noticeable. Price cutting and customer resistance are apparent in some cases.

Frontier Power Co., Trinidad, Colo.—No campaigns are needed or planned, according to George Warren, electrical engineer. Consumer resistance to prices not apparent.

Glendale Public Service Dept.—Price resistance is not evident, says George D. Hastings, commercial agent. Dealer inactivity is a merchandising problem in the area.

Hawaiian Electric Co.—Planning

campaigns on electric ranges, water heaters and dryers, according to C. E. Nolan, vice-president and promotional manager. Will continue its home service program of last year and initiate cooking classes in country districts, store demonstrations, employee classes, classes for teenagers and occasional classes for men, kitchen parties and a washer promotion. Price resistance is noticeable. Major problems are dealer inactivity, price cutting, shortage of salesmen and terms.

Heber Light & Power Co.—Campaigns are planned on electric ranges and water heaters, reports L. A. Woolton. Price resistance is not apparent, but credit is a problem.

Hilo Electric Light Co.—We will promote electric ranges, water heaters, home freezers and dryers, says H. N. Callard, general manager. There is no consumer price resistance, but dealer inactivity and shortage of salesmen are merchandising problems. Strikes have delayed home building and purchasing on the island.

Idaho Power Co.—Planning campaigns on electric ranges, water heaters, home freezers and dryers, according to A. S. Gilbert, sales promotion director. Price cutting and a shortage of salesmen are problems.

Logan City Municipal Electric Light Plant—Campaigns are not needed for load building, reports Clifton Haws, superintendent.

Los Angeles Department of Water & Power—Promotions are needed and we will run campaigns on electric water heaters, home freezers and electric bedding, says Charles C. Snyder, business agent. Price resistance is evident. There is considerable shopping around and some price cutting, but the situation has been improved recently. Dealer inactivity, shortage of salesmen and installation costs are merchandising problems. Reports that television is currently holding the spotlight in that area.

Well-organized promotional programs like that of Utah Power & Light bring sales results for dealers, distributors. Here W. A. Huckins, UP&L general sales manager, brought the 1949 program to Ogden division personnel. Later, at a big meeting, electrical dealers were told plans for power company's program

Modesto Irrigation District—Campaigns for load building are needed, says K. W. Biesemeier, engineering aide. Consumer resistance to prices is apparent. Major problems are installation costs and customer resistance.

Montana-Dakota Utilities Co.—Promotions are needed and a special campaign with dealers on electric ranges is planned, according to Thomas W. Hughes, division manager. Price resistance is noticeable. Price cutting, manufacturers' price changes, shortage of salesmen, installation costs, trade-ins and credit are all merchandising problems in the area.

Montana Power Co.—Campaigns are needed, especially for rural load building, reports D. J. McGonigle, general sales manager. Promotions are planned on electric ranges, water heaters, home freezers and dryers. Consumer price resistance is not evident. Failure of many dealers to employ outside salesmen, a shortage of salesmen, installation costs, credit and terms are major problems.

Mountain States Power Co.—No promotions are needed or planned, reports F. J. Kubes, treasurer. Consumer price resistance is not apparent. Installation costs are high in the area.

Murray City Power & Light—Campaigns are needed for load building, but no specific promotions are planned.

Pacific Gas and Electric Co.—Campaigns are needed to move the volume of appliances now available to the industry, reports O. R. Doerr, vice-president in charge of sales, and we will cooperate with the industry as far as possible in promoting these appliances. To date there is evidence of a relaxing of customer resistance to prices. Major merchandising problems are dealer inactivity, shortage of salesmen and installation costs.

Pacific Power & Light Co.—It is problematical that campaigns are needed to build load, reports C. A. Root, general sales manager. No specific campaigns are planned. To some extent price resistance is evident.

Pasadena Municipal Light & Power Dept.—Campaigns are needed for load building, but no specific promotions

The Dealer Situation in Figures

State	% Increase Since 1940	% Increase Over 1948	Number Customers Per Dealer 1949	Number Customers Per Dealer 1948	Customer Increase
*Washington	41.8	— 0	250	291	2.7 %
Oregon	37.2	— 7.3	327	297	4.34
California	86.9	— 0.3	580	548	5.74
Pacific Coast	**67.3**		**386**	**378**	
Montana	21.43	— 9.2	229	198	
Idaho	50.00	+25.	155	181	5.45
Wyoming	117.5		283	609	
Colorado	59.42		491	778	
†Arizona	95.15	— 3.7	562	269	8.15
Utah	280.23	— 0.7	231	224	
Nevada	60.24	— 8.9	241	221	12.1
Intermountain	**120.47**		**321**	**233**	**4.9**
British Columbia	119.15	+39.	581	563	5.11
Hawaii	200.00	+57.	706	260	6.86

*Washington situation complicated by Puget Sound P&L losses of territory to PUDs and no reports from PUDs as yet.
†Arizona figures reflect acquisition of properties hitherto not reporting.

Contrast between how things were done in '49, a century ago, with modern electric ways of doing housework was made by paintings of the old way, done by Ray Fisher and staff, hung over corresponding appliance in Southern California Edison's county fair exhibit. Attendants were dressed in '49er costume

are planned, according to F. V. Frey, supervisor, customer relation division. Price resistance is apparent. Major problems are dealer inactivity, dealers dropping out, price cutting and customer resistance.

Portland General Electric Co.—No campaigns are planned, reports A. C. McMicken, general sales manager. Price resistance is not as evident as in 1948. In diminishing degrees dealer inactivity, customer resistance, installation costs and trade-ins are merchandising problems.

Provo Department of Utilities—Specific promotions are planned on electric water heaters and home freezers, according to E. A. Jacob, superintendent.

Public Service Co. of Colorado—Will run seasonal campaigns on water heaters and home freezers, although campaigns are not needed for load building, according to G. B. Buck, vice-president and commercial manager. Price resistance is evident. Dealer inactivity, price cutting, trade-ins and terms are merchandising problems in the area.

Public Service Co. of New Mexico, Deming—Campaigns are needed to build load in the area, reports B. W. Fields, office manager. Consumer resistance to prices is evident. Dealer inactivity, shortage of salesmen and installation costs are major merchandising problems in the area.

Public Service Co. of New Mexico, Las Vegas—Foresees no need for campaigns to build residential load in the near future, reports R. E. Thompson, division manager.

Public Service Co. of New Mexico, Santa Fe—Promotions are needed for load building. A new power plant is now under construction, according to J. E. Flynn, division purchasing agent. Resistance apparent not in prices but consumer unrest. Small amount of customer resistance.

Puget Sound Power & Light Co.—Campaigns will be needed to build load in 1951, but no specific promotions are planned, says C. Patrick Johnson, vice-president. Consumer resistance is not noticeable. Shortages of electrical appliances and installations costs are problems in the area.

Raton Public Service Co., New Mexico—Electric ranges, water heaters, home freezers and dryers will be promoted, says I. G. Horner, general manager. Price resistance is evident. Installation costs and customer resistance are major merchandising problems.

Raulins Electric Co.—When power is available there will be a need for campaigns to build load, according to James A. Chapman. Promotions are planned on electric ranges, home freezers and dryers. Consumer resistance to prices is evident. Merchandising problems are dealer inactivity, price cutting, trade-ins and power shortage.

Riverside Electric Light Dept.—With dealers will promote electric ranges, water heaters and home freezers. Major problems are dealer inactivity and shortage of salesmen, reports C. G. Dahlgren, general foreman.

Sacramento Municipal Utility District—In cooperation with dealers will run promotions on electric ranges, water heaters, home freezers and dryers, according to Ray L. Dunshee, commercial and sales manager. Price resistance is not apparent. Biggest problems are dealer inactivity, shortage of salesmen and installation costs. Cost of range installation is biggest problem in the area.

Salt River Valley Water Users' Assn.—Campaigns are needed to build load, says R. F. Harnee, power service manager. Promotions are planned on electric ranges, water heaters and home freezers. Price resistance is noticeable. Major problems are installation costs and customer resistance.

San Diego Gas & Electric Co.—Will run promotions on electric ranges, water heaters and home freezers, reports H. G. Dillin, vice-president in charge of sales. Consumer resistance to prices is not evident. Major problems are shortage of salesmen and manufacturers changing models too frequently.

Seattle Department of Lighting—Campaigns for load building are needed for conversion of the older homes using fuel stoves, reports J. D. Gawne, electric sales supervisor. Specific promotions are planned on electric ranges and water heaters. Price resistance is noticeable. Dealer inactivity, dealers dropping out, price cutting, installation costs, credit and finance of dealer paper are major merchandising problems.

Sierra Pacific Power Co.—Plans no campaigns, according to A. L. Pierce. There is no price resistance. Price cutting is the biggest merchandising problem in the area.

Southern California Edison Co.—Is planning campaigns on electric ranges, water heaters and freezers, reports H. C. Rice, manager of domestic sales. Price resistance is noticeable. Biggest problems are dealer inactivity, dealers dropping out, price cutting, manufacturers' price changes, shortage of salesmen, customer resistance and installation costs.

The economy for electrical appliance sales in southern California for 1950 is very promising because of the large volume of residential building which is continuing.

The saturation on the larger appliances such as ranges, water heaters, refrigerators, is actually below prewar—so that the electrical industry has a big job just to catch up on this backlog of business.

Added to this is the large amount of obsolete equipment in the hands of

Appliance 1949 Sales

Utility Territory	REFRIGERATORS 1949 Sales	% Sat.	FREEZERS 1949 Sales	RANGES 1949 Sales	% Sat.	WATER HEATERS 1949 Sales	% Sat.	WASHERS Conventional 1949 Sales	WASHERS Automatic 1949 Sales	% Sat.
Alameda P.U. Dept.	350	80	60	198	20	12	4	50	70	85
Arizona Edison	4,000	70	200	400	60	200	40	1,600	1,600	60
B.C. Elec. Ry. (Vancouver)	8,800	31	100	6,500	22	3,500	9.8	15,000	1,500	71
B.C. Elec. Ry. (Victoria)	975	23.4	6	1,200	19	325	7.6	2,000	260	67.6
Burbank P.S. Dept.	300	70	40	120	15	30	6	...	60	5
Calexico P.U.	50	75	10	25	50	25	50	...	25	75
Calif. Elec. Power	2,400	85	300	1,000	30	700	20	2,000	850	98
Calif. Oregon Power	4,900	...	300	4,500	53	3,500	48	3,000	425	...
Calif. Pacific Utilities	2,011	77	250	1,249	45	1,008	35	2,900	600	91
Cheyenne L. Fuel & P.	1,800	90	195	550	40	270	25	1,000	175	85
Coast Counties G.&E.	3,515	85	350	540	13	415	10	1,000	650	40
El Paso Electric	7,300	86	450	1,000	25	650	17	...	...	40
Eugene Water & Elec.	...	...	...	1,400	78	1,000	60	...	...	...
Fort Collins L&P Dept.	600	75	120	425	45	15	5	550	50	85
Frontier Power	250	60	50	300	40	200	20	200	40	70
Glendale P.S. Dept.	1,000	65	...	500	20	125	2.5	...	...	...
Grays Harbor PUD No. 1	...	...	...	846	43.3	842	37.9	...	...	...
Hawaiian Electric	10,000	91	1,000	5,000	30	4,000	24.5	7,000	3,000	82
Heber L&P	70	90	30	50	25	75	25	50	25	90
Idaho Power	11,642	85	2,130	8,636	70	5,313	50	2,084	3,561	95
Imperial Irrig. Dist.	3,200	...	250	750	...	300	...	1,200	475	...
Los Angeles Dept. W&P	...	76.5	...	4,800	8	4,250	4.2	...	...	...
Montana-Dakota Utilities	200	75	25	100	10	10	5	180	60	75
Montana Power	...	75	...	5,000	35	2,500	8	...	...	73
Mountain States Power	...	77	...	...	50	...	38	...	...	73
Pacific G&E	105,800	74.7	12,200	17,700	13.4	9,500	7.9	80,200*	...	...
Pacific P&L	26,000	...	3,500	20,000	...	11,500	...	21,500*	...	...
Pasadena L&P Dept.	...	90	...	609	10	127	3	...	...	...
Payson Mun. System	...	50	15	...	...	100	...	50	10	80
Portland Gen. Elec.	...	75	...	...	65	...	48	...	...	...
P.S. of N.M. (Deming)	100	65	10	10	10	2	1	40	10	25
P.S. of N.M. (Santa Fe)	525	50	50	75	.01	25	...	450	125	60
Puget Sound P&L	...	70	...	...	47	...	38	...	...	60
Rawlins Elec. Co.	175	85	75	100	90	25	95	35	75	85
Riverside L. Dept.	...	...	...	453	...	79	...	...	...	...
Sacramento MUD	9,650	...	1,605	2,218	...	626	...	6,270*	...	...
San Diego G&E	16,000	11.2	4,000	3,500	...	3,000	9.1	10,000	6,000	...
Seattle City Light	...	72	...	5,500	75	4,000	47	...	...	64
Sierra Pacific Power	1,628	70	...	898	55	614	24	...	...	...
So. Calif. Edison	45,000	55	6,000	9,500	9.5	3,700	4	40,000*	...	60
So. Colorado Power	2,400	80	150	500	24	300	7	1,500	350	75
So. Nevada Power	1,100	95	100	700	90	600	90	500	300	75
So. Utah Power	90	...	40	110	...	100	...	40	75	...
Southwestern P.S.	1,149	41	93	288	17	67	.03	307	326	7
Spanish Fork Mun.	...	70	...	...	30	...	15	...	...	85
Springville Mun.	200	...	40	100	...	100	...	100	20	...
Tacoma City Light	...	...	...	2,570	69	2,300	59	...	...	...
Telluride Power	600	75	200	400	43	400	22	...	...	90
Utah P&L	14,916	80	2,739	8,062	40	5,740	32	9,766	3,895	87
Washington Water Power	10,725	78	1,535	8,210	42	5,600	38	5,000	4,315	69
Western P.S. Co.	500	50	65	130	10	15	1	325	130	70

* Includes both conventional and automatic washers.

Utility Territory	DISH-WASHERS 1949 Sales	FOOD WASTE UNITS 1949 Sales	IRONERS 1949 Sales	% Sat.	DRYERS 1949 Sales	RADIOS 1949 Sales	% Sat.	TELEVISION SETS 1949 Sales	% Sat.	CLEANERS 1949 Sales	% Sat.
Alameda P.U. Dept.	10	20	50	10	30	400	90	150	2	100	90
Arizona Edison	100	100	150	15	...	2,000	90	...	...	4,000	40
B.C. Electric Ry. (Vancouver)	25	15	1,100	.07	125	25,000	127.6	125	...	9,500	70.2
B.C. Electric Ry. (Victoria)	9	10	160	3.5	20	4,625	97	30	.01	1,625	80
Burbank P.S. Dept.	...	25	...	...	...	...	...	400	7	...	...
Calexico P.U.	...	...	5	1	2	...	...	...	...	...	75
Calif. Elec. Power	150	...	200	3	75	...	100	...	1	...	...
Calif. Oregon Power	...	...	650	...	125	...	...	...	...	1,800	...
Calif. Pacific Utilities	125	75	300	8	150	...	98	...	...	500	85
Cheyenne L. Fuel & P.	110	40	190	20	75	2,500	95	...	...	2,095	50
Coast Counties G.&E.	110	150	215	5	50	4,125	99	340	1	...	...
El Paso Electric	150	20	...	5	...	...	...	...	...	550	85
Fort Collins L&P Dept.	30	40	100	8	2	900	98	...	...	200	50
Frontier Power	20	20	30	5	10	300	90	...	...	...	...
Hawaiian Elec.	500	300	...	6	...	...	98	...	...	...	...
Idaho Power	617	383	2,011	8	524	8,634	95	...	...	2,152	95
Imperial Irrig. Dist.	50	30	150	...	20	...	...	349.676†	18	...	...
Los Angeles Dept. W&P	...	...	...	...	...	...	...	...	...	...	...
Montana-Dakota Utilities	5	5	15	2	...	500	90	...	...	200	50
Mountain States Power	...	...	...	8	...	...	95	...	...	...	63
Pacific G&E	4,700	...	11,400	12.6	2,500	119,700	98	20,000	1.7	31,800	68
Pacific P&L	...	...	3,200	...	1,800	37,500	...	...	...	12,000	...
Payson Mun. System	6	...	...	...	...	100	...	10	...	...	...
Portland Gen. Elec.	...	...	...	...	...	...	100	...	...	...	75
P.S. of N.M. (Deming)	2	2	13	10	5	150	85	...	...	20	60
P.S. of N.M. (Santa Fe)	15	8	50	1	10	...	75	...	...	300	20
Puget Sound P&L	...	...	...	5	...	...	99	...	...	...	52
Rawlins Elec. Co.	10	10	15	90	25	200	95	...	...	150	95
Sacramento MUD	...	...	1,237	...	...	12,000	...	...	...	3,500	...
San Diego G&E	800	4,000	4,500	...	400	25,000	...	11,000	...	12,000	...
Seattle City Light	...	...	...	12	...	...	90	...	3	...	55
So. Calif. Edison	2,000	2,500	7,000	10	1,000	40,000	...	42,000	10	20,000	...
So. Colorado Power	80	60	250	4	50	4,000	95	...	...	1,000	80
So. Nevada Power	50	50	75	5	10	450	100	...	...	350	75
So. Utah Power	50	12	75	...	10	300	...	...	...	80	...
Southwestern P.S.	144	14	149	...	28	1,174	82	...	...	275	11
Spanish Fork Mun.	...	...	...	10	...	...	90	...	5	...	50
Springville Mun.	75	50	100	...	25	300	...	2	...	150	...
Utah P&L	644	748	2,527	6	794	19,292	99	816	10	10,557	75
Washington Water Power	600	325	1,645	9	1,050	17,100	94	...	...	4,100	86
Western P.S. Co.	40	15	65	5	25	500	100	...	...	240	80

† Total estimated sales Los Angeles TV area as of Dec. 31, as tabulated by So. Cal. Radio & Elect. Appl. Dealers Assn.

the public which should be replaced, and on top of all this, is the opportunity for sales in the new homes being constructed—estimated at more than 45,000 in 1950 on the Edison system alone.

The greatest problem facing the entire industry in the moving of merchandise from the manufacturer to the customer is at the point of sale. Dealers and their salesman need support and assistance in market analysis and sales technique if this vast volume of merchandise is to move across the 18 inches, i. e., the width of the dealer's counter that separates the manufacturer from the utlimate consumer.

Southern Colorado Power Co. — With dealers will run campaigns on electric ranges, water heaters and home freezers. Price resistance is noticeable. Major problems include dealer inactivity, price cutting, shortage of good salesmen, installation costs and customer resistance, reports E. H. Pemberton, supervisor of sales promotion.

Southern Nevada Power Co.—Foresees no need for campaigns to build load. No price resistance. Price cutting and shortage of salesmen, says S. J. Lawson, general manager, are the biggest merchandising problems.

Southwestern Public Service Co., Roswell, N. M. — Campaigns are needed and planned on electric ranges, water heaters, home freezers and dryers, according to A. P. Coolidge, utilization manager. Price resistance is not evident. Major problems are dealer inactivity, shortage of salesmen and installation costs.

Spanish Fork Municipal Power & Light Corp.—Promotions are planned on electric ranges, water heaters, home freezers and dryers, says W. P. Shippee, superintendent, power department. Price resistance is noticeable. Dealer inactivity, dealers dropping out, manufacturers' price changes and installation costs are major problems.

Springville Municipal Corp. — No campaigns are planned, reports L. E. Wiscombe, engineer. Resistance to prices is apparent. Problems in the area are manufacturers' price changes, shortage of salesmen and customer resistance.

Tacoma Department of Public Utilities—No promotions are planned, according to J. Frank Ward, superintendent of the light division. Price resistance is noticeable. Dealers dropping out, installation costs and some distress merchandise pose the biggest problems.

Telluride Power Co. — Will run campaigns on electric ranges and water heaters. Price resistance is noticeable, says W. O. Cluff, sales manager. Price cutting, shortage of salesmen and customer resistance are problems in the company service area.

Tucson Gas, Electric Light & Power Co.—Foresees the need for campaigns, according to A. R. Seaman, commercial manager. To some extent price resistance is noticeable. Major problems are installation costs, trade-ins and lack of aggressive salesmanship.

Turlock Irrigation District — Planning no specific campaigns, according to H. M. Wallin, electrical superintendent.

Utah Power & Light Co. — Campaigns are needed and planned on electric ranges, water heaters, home freezers and dryers. Dealers report price resistance. Biggest problems are price cutting, shortage of salesmen and the usual amount of customer resistance, according to W. A. Huckins, sales manager.

Washington Water Power Co. — Campaigns are needed for load building, but the power supply does not permit, according to L. C. Aston, sales promotion manager. Dealers will promote electric ranges, water heaters, home freezers and dryers. Price resistance is noticeable. Major problems are manufacturers' price changes and a shortage of salesmen.

Western Public Service Co., Laramie, Wyo. — Campaigns are needed and planned on electric ranges, water heaters and dryers, reports W. L. Breslin, president. No price resistance is apparent. Manufacturers' price changes and installation costs are biggest problems.

Wiring Promotion

Not all of the utilities are carrying on adequate wiring programs. The outstanding job is that done by Washington Water Power Co.'s Homer Bender, with the B. C. Electric Railway, Southern California Edison, Public Service Co. of Colorado, Utah Power & Light Co. and San Diego Gas & Electric Co. doing excellent work also. Specific reports on what is being done follow:

B. C. Electric Railway Co.—Continuation of Red Seal wiring program with more than 600 complete wiring plans drawn up for home owners during the year. The 100-amp. main service switch is becoming more or less accepted as the standard in this area for residential use. The Electrical Service League's Red Seal wiring plan is jointly sponsored by manufacturers, distributors, dealers, contractors and public utility. The Service League has a representative who works on Vancouver Island also.

California Electric Power Co.—Upon request assistance is given in requirements, codes, placing of convenience outlets, etc., but no actual promotional program is being

Larger Entrance Needed?
ADEQUATE WIRING NEEDS AN ADEQUATE ENTRANCE TOO!
'A 100-Amp. Service Entrance
LOOK TO THE WASHINGTON WATER POWER FOR THE BEST IN ELECTRICAL LIVING
Larger Entrance Needed?
ADEQUATE WIRING NEEDS AN ADEQUATE ENTRANCE TOO!
'100-Amp. Service Entrance
LOOK TO THE WASHINGTON WATER POWER FOR THE BEST IN ELECTRICAL LIVING

Adequate Wiring just doesn't take by itself. It requires constant selling. An outstanding job on its promotion is being done in Washington Water Power Co. areas where contractors surround the company ads with ads of their own and 100-amp. service entrance is made the goal for all residential wiring jobs

followed by the company at present.

California-Oregon Power Co.—Various pamphlets for distribution through dealers and company offices.

California-Pacific Utilities Co.—Advertising, wiring contractor cooperation, customer booklets.

Central Arizona Light & Power Dept.—Advertising; calls on architects, contractors and builders.

Coast Counties Gas & Electric Co.—Sales specialists working with electric contractors and builders; also occasional advertising promoting adequate wiring.

Glendale Public Service Dept.—Has no promotional program, but does make range and water heater wiring allowances.

Hawaiian Electric Co.—Service to contractors, architects and customers.

Hilo Electric Light Co.—We have a program to contribute to range and water heater wiring.

Idaho Power Co.—Direct contacts and radio and newspaper advertising.

Imperial Irrigation District—Cooperation with local chapter of NECA in promoting adequate wiring.

Los Angeles Department of Water & Power—Presentations to speculative and owner-builders on advantages; adequate wiring folders; contact with architects, builders and electrical contractors; wiring layouts on request.

Modesto Irrigation District—Advertisements coupled with education of electrical contractors.

Montana Power Co.—Advisory service to customers, architects and builders, etc.

Mountain States Power Co.—No program, however we do some newspaper advertising and window display material pointing out advantages of adequate wiring.

Pacific Gas and Electric Co.—Adequate wiring is promoted on an active basis in all PG and E territory through the medium of newspaper ads, billboard displays, truck banners, window displays and a series of periodical advertisements over the signature of the Northern California Electrical Bureau, appearing in *Sunset* and other leading magazines published in this area. PG and E personnel follow jobs through to completion in the various operating districts and the Northern California Electrical Bureau issues all certificates.

Pacific Power & Light Co.—Education of sales personnel concerning its importance. Work with future farmers, and 4-H clubs, architects and dealers.

Pasadena Municipal Light & Power Dept.—We assist in consumer wiring circuits for electric ranges and water heaters, but make a minimum charge of $20 and $10 respectively which is the total cost in 90% of all installations.

Portland General Electric Co.—No set program; activities consist of periodic talks before wiring contractor groups, architects, builders and others and use of adequate wiring promotional material.

Public Service Co. of Colorado—For more than ten years we have carried on an aggressive adequate wiring program primarily in cooperation with the Rocky Mountain Electrical League. In the districts and areas served by Public Service Co. of Colorado, members of our commercial department, with specialized training along this line, have conducted meetings with the electrical contractors and other interested groups. Much publicity has been devoted to the adequate wiring program. Also pertinent literature has been distributed by direct mail and through other proper organizational channels. The company has participated in the promotion of home shows, dealer-distributor exhibits and other similar promtoional activities. The proper distribution of the adequate wiring certificate has been aggressively promoted and the adoption of the National Electrical Code has been advocated. All of this, of course, is done throughout our area in the interest of uniformity and the reduction in the cost of wiring.

Raton Public Service Co.—Cooperative newspaper advertising with electrical contractors.

Riverside Electric Light Dept.—We furnish complete layouts to builders, new work and remodeling. We do everything possible to help our customers with any of their wiring problems.

Sacramento Municipal Utility District—Support of Sacramento Electrical League to the extent of providing adequate wiring inspection service. The league is certifying agent for the utility district.

Salt River Valley Water Users Assn.—Contractor cooperation and standardization with city and other utilities.

San Diego Gas & Electric Co.—The certifying agency is the Bureau of Radio & Electrical Appliances of San Diego County. The company promotes adequate wiring through electrical contractors and builders, checks plans and makes inspections.

Seattle City Light—We hope for changes in minimum standard of city wiring code that will provide high adequate wiring standards.

Southern California Edison Co.—Thirty men in the field contacting new homebuilders. Newspaper, magazine and radio and direct mail advertising.

Southern Colorado Power Co.—We are promoting the National AW Plan by the NAWB and NEMA.

Southern Utah Power Co.—Nothing special, just good cooperation with the contractors.

Utah Power & Light Co.—We maintain two specialists in our largest divisions who devote full time to this work. They call on builders, contractors, architects, etc.

Washington Water Power Co.—Code revisions, standardization of metering, planning service and system-wide dealer and customer promotion.

Lighting Programs

What is being done by the utilities to assist the industry at large in the development of commercial, industrial and school lighting is also of importance to the contractors, lighting equipment manufacturers and distributors. Many have well organized programs, as reported below:

Anaheim Light, Power & Water Dept.—Modernization of ornamental street lighting is under study.

B. C. Electric Railway Co.—Yes, very active promotion in commercial, school and street lighting fields. Intend also to develop industrial lighting field in 1950.

Commercial program consists of a direct mail campaign sent out to selected commercial customers. The selection is made on the basis of a visual inspection of the premises from the outside by one of our representatives, disclosing the need for better lighting. The selected customers are sent a series of three broadsides followed with a store lighting booklet based on the EEI material prepared locally. Each mailing is ultimately followed up by a representative. The object, of course, is to solicit a request to have a store lighting plan drawn up for the customer. This program was started last March and will continue on through 1950, as the mailings must be geared to the capacity of our lighting sales section to produce lighting plans resulting from the mailings.

In the last two months we have sent two direct mail pieces to all store customers, urging the better use of existing lighting equipment. We intend to follow this up with further direct mailings in 1950.

School lighting has taken the form of a continuous campaign over the last two years, directed at school principals, school board members, PTA groups, etc. Edison Institute material has been used. We have followed this up with promotional work with architects and engineers responsible for construction of new schools, and with school boards responsible for rehabilitation of existing schools. We have also given support to the major IES school lighting project in north Van-

couver, which consisted of relighting two school rooms in the high school to modern IES standards. This project attracted considerable attention and comment. We arranged to have school board officials from all over our territory visit this school. Good results are being obtained from all this work, and the level of school lighting is being consistently improved.

Since the end of the war we have devoted considerable attention to improving the street lighting in the communities served by our company. We have facilitated the installation of modern light luminaires at appropriate mounting heights and distances, and after some two year's effort we can now say that practically every community in our territory has been persuaded to install some new and better IES traffic safety lighting. One or two of the first communities to respond to our efforts have been back with repeat orders. They have been very pleased with our results in this direction. In addition to this, the city of Vancouver itself, which makes extensive use of ornamental lighting systems, has, since the war, been very active and put in a number of very good lighting installations on the principal streets of Vancouver.

California Electric Power Co.—Yes, we have a consultant who makes lighting layouts and recommends certain equipment, but we do not make direct sales.

California-Oregon Power Co.—Yes.

California - Pacific Utilities Co. — Technical advice to all types of customers in cooperation with wiring contractors who make the new installations.

Central Arizona Light & Power Co.—We have five commercial sales consultants calling on customers.

Coast Counties Gas & Electric Co.—Sales specialists work with municipal, county and other organized lighting districts to promote better highway lighting.

Glendale Public Service Dept.—Increasing size of lamps in practically all ornamental lights. Installing center suspension lights at important intersections where there are none.

Hawaiian Electric Co.—Five engineers employed for this work.

Idaho Power Co.—Our commercial, industrial and school lighting program is effectively carried out by six company representatives contacting the customers and providing a lighting and wiring layout service. We are carrying on a street lighting program with our municipalities by acquainting them with new developments in street lighting and providing them with an over-all plan for eventual provision of street lighting in accordance with the minimum safety standards.

Imperial Irrigation District — We are working on a long-range program of improved street lighting.

Los Angeles Department of Water & Power—Direct sales promotion efforts with commercial, industrial and school customers.

Modesto Irrigation District—Make lighting recommendations on request.

Montana-Dakota Utilities — Schools —making complete survey for possible changes. Street lighting—planned on new ornamental system in business area.

Montana Power Co. — Advisory service on commercial, industrial and school lighting. Active street lighting activity has been carried on during post-war years.

Mountain States Power Co.—We are encouraging street lighting modernization in all of our cities.

Pacific Gas and Electric Co.—The present PG and E program regarding these activities involves assistance to customers upon request for advice, together with aid extended to dealers, contractors and engineers in preparing adequate and proper lighting layouts, which are in accordance with present-day standards. Long-range educational work and planning is under way to aid schools and municipalities in modernization programs for lighting for schools and streets.

Pacific Power & Light Co.—Take care of requests from commercial, industrial and school customers for lighting information and help. Are putting new street lighting in many of our towns.

Pasadena Municipal Light & Power Dept.—No regular program, offer aid to inquiries.

Portland General Electric Co.—No planned program. Services of our illuminating and street lighting engineers is available upon request. (This company however has done an outstanding job through the operation of a street lighting laboratory which has aided a great many of its communities to install modern, efficient street lighting—The Editors.)

Street lighting was modernized almost everywhere in the West last year; more programs are contemplated this year. The scene at left is along Wenatchee Ave., Wenatchee, where 156 mercury units replaced old ornamental and increased illumination seven times; 66 more are to be installed this year. At right, typical of modern lighting installed in small as well as large cities is that in and around Burnside Chevrolet Co. in Baker, Ore., installed by York Electric. It includes three 750-watt floods and two 500-watt island units over the gas station area, neon signs; six 4-lamp URC units each in the showroom and office, reflector spots, 25 300-watt RLM units in the service shop

Public Service Co. of Colorado—In our area in connection with commercial and industrial lighting, we provide, without charge, an engineering service including the drawing of lighting layouts. This is done on request to customers or architects, contractors or any other construction or contracting agency which desires this service. We also provide pertinent literature, reports and other available information that may be helpful to these customers. We do not sell lighting fixtures. In connection with school lighting, we have carried on a very extensive promotion and cooperative program with the schools. There too we provide, without charge, engineering service, lighting layouts, sketches and designs of suitable fixtures and any other available pertinent information that may be helpful to the schools, to the contractors, or to the fixture manufacturers. All such information and help is being rendered to any of the schools in our area. The program in the Denver schools has been of such magnitude and caliber that it has recently been publicized in some of the technical magazines on lighting.

Street lighting—a very aggressive program on street lighting has been conducted in the area we serve for the past several years. In each town involved, engineering service has been rendered. Brochures and other data have been prepared to meet individual problems. As a consequence of this promotional effort, many of the towns and cities in this area have very fine street lighting systems.

Puget Sound Power & Light Co.—Very limited.

Riverside Electric Light Dept.—We have no particular lighting program, but we do furnish the services of our lighting specialist to all of our customers. We also are converting some of our street lighting to mercury vapor.

Sacramento Municipal Utility District—We make lighting recommendations to all new commercial and industrial customers. Work with Sacramento City School Board to develop a systematic school relighting program. Active development of IES chapter. Architects and engineers are participating. No comprehensive street lighting program.

San Diego Gas & Electric Co.—Yes. Under direct supervision of engineer in charge of commercial and lighting sales, power sales and street and highway lighting sales respectively.

Seattle City Light—Provide commercial and industrial advisory assistance. New mercury vapor safety lighting being installed on main arterials throughout the city.

Sierra Pacific Power Co.—Lighting engineer works closely with cities and towns and also with contractors, builders and architects.

Southern California Edison Co.—We have 27 lighting consultants and three lighting engineers actively engaged in the promotion of industrial, commercial and school lighting. Two street lighting engineers are working with 27 lighting consultants on street lighting promotion.

Southern Colorado Power Co.—Promotions, surveys and recommendations on all lighting.

Southwestern Public Service Co.—Limited.

Utah Power & Light Co.—Yes. Ours is a continuous program on the subjects.

Washington Water Power Co.—School and street lighting programs systemwide are in operation to be complete in 1951.

Industrial Development

The economy of an area has much to do with its industries and their prosperity or ill health. Many utilities take an energetic part in developing new industries and assisting existing industries to expand their markets. A review of what Western utilities are doing in that respect follows, as well as a mention of any new projects or developments in the community which will reflect in business conditions.

Alameda Bureau of Electricity—We cooperate with the Chamber of Commerce in trying to get more industries.

Anaheim Light, Power & Water Dept.—Has no industrial program, but reports several subdivisions are contemplated and also some new industries.

B. C. Electric Railway Co.—We subscribe to, and make use of, the Research Advisory Service sponsored by the Northwest Electric Light & Power Assn., to assist our industrial customers with industrial problems. We supplement this information obtained from the B. C. Research Council and the National Research Council (Canada).

We have a man occupied full time on site work who is responsible for helping new industries, or industries inquiring, to locate suitable sites in this territory for their project. We maintain close liaison with the Department of Trade and Industry in Victoria and do everything in our power to make available to prospective industrials or clients all pertinent information that might affect their operation here, and persuade them to settle here. For some years we have maintained extensive advertising on the theme, "Industry is Moving to B. C.," which advertising has produced and continues to produce inquiries from all over the world.

Home lighting promotion is only being done by two utilities through active sales programs. Central Arizona Light & Power Co., Phoenix, home service girls, as in the above, called on homes and demonstrated lighting equipment. The other utility was Public Service of Colorado. Others did advertising but staged no campaigns. Only three reported dealer sales of units — Coast Counties, 1,000; Utah Power & Light, 15,639; Washington Water Power Co., 14,700, which includes many types

Two items are of major interest at the moment: First, the action of the Canadian federal government in sponsoring the scheme which will have the effect of materially reducing the amount of cash required as down payment by the buyer of a new home. Complete details are not yet available, but already there has been a considerable increase in the number of building developments to meet the undiminished need in this area for new housing communities.

Secondly the Aluminum Co. of Canada Ltd. is now conducting engineering surveys in the area south of Prince Rupert. If these surveys are satisfactory, they propose to construct a huge aluminum reduction plant in that area. Should this project materialize, and there is every hope that it will, it would have a tremendous effect on the whole of economic well-being of the province of British Columbia, in which we in the lower mainland area would certainly share, as most of the secondary industry in the province is located in our territory.

There is every indication that all branches of the electrical industry will have a most active year in 1950. There have been some setbacks with regard to world markets in some of our primary industries, but the over-all pic-

ture would indicate a continued high level of employment in the area we serve.

In Victoria the Department of National Defense building housing projects and there are also other government building programs.

California Electric Power Co. — Offers personal contacts in engineering advice. There are some proposed housing projects.

California Oregon Power Co. — Is active in promotion of lumber manufacturing.

California-Pacific Utilities Co. — Industrial surveys are being conducted in cooperation with local Chambers of Commerce. No new outstanding projects, with the exception of housing, which still continues at a remarkable rate established in 1948.

Central Arizona Light & Power Co. —Working with Chambers of Commerce, letters, pamphlets, selected mailings.

Coast Counties Gas & Electric Co. —Services of sales engineer available to assist in electrical applications to processing. Industrial employment in Watsonville area is creating considerable residential building activity.

Colorado Springs Department of Public Utilities—General cooperation with developments.

Eugene Water & Electrical Board—Several housing projects, including two new apartment buildings.

Hawaiian Electric Co. — We give technical assistance to industries. Everyone is well aware that this territory suffered a severe economic setback owing to the longshoremen's strike last year, but we are hoping, if we remain free from strikes and other unknown obstacles and with a good tourist year, that business should be better than fair in the territory.

Idaho Power Co. — The Industrial Development Program of the Idaho Power Co. consists of three parts. First, the preparation of an economic survey for the community. The information for this survey is gathered from government and industry sources and is a result of a cooperative effort between the company and the local Chamber of Commerce. This information is compiled into pamphlet form under headings representing the various phases of the economy of the community. Separate files are kept of each of these phases and the company assists the community in keeping all information current. The original economic survey contains a complete back history of all the various industries, raw materials, etc.

Second, Idaho Power assists the community in preparing a brochure. The brochure is a multicolored illustrated pamphlet highlighting the existing industries and the raw materials available in an area. These brochures are distributed to prospective industries and others who might be interested in locating in the community served.

Third, the company assists the community in preparing prospectuses for new enterprises. This again is a cooperative effort with the local Chamber of Commerce and an analysis is made of the community's resources and possibilities. This information is then directed to prospective enterprises.

In general the development in our territory is confined to numerous small businesses which individually do not reflect in business conditions, housing, etc. Collectively, however, they have resulted in substantial increases in our towns.

There are several major developments, which will result in a direct reflection to community affairs. They are as follows:

1. The development of the Westvaco Division of the National Food Machinery Corp. at Pocatello, Idaho. This company has installed one electric furnace for the production of phosphorus and has a second under construction which will be completed in the early part of 1950.

2. The development of a cobalt mine near Salmon, Idaho. This mine is developed by the Celeri Mines Co. and will result in the creation of a new community at the mine site. The chief production of this mine will be the production of cobalt.

3. A smelter at Stibnite, Idaho, for the production of antimony will reflect in an increase in the community of Stibnite.

Los Angeles Department of Water & Power — Makes direct sales presentations of the advantages of locating industry in Los Angeles County to prospective industrial customers. New residential and commercial and industrial expansion is expected to continue at approximately the present rate.

Montana Power Co. — Cooperating with state and local Chambers of Commerce and other organized groups interested in industrial expansion and development.

Pacific Gas and Electric Co.—The principal activities of PG and E in regard to industrial development are to lend assistance to Chambers of Commerce and other civic organizations in their programs of promoting and/or expansions of industrial plants —with minor amounts of direct work with principals of prospective new industries who are considering a California location.

There are no substantial new developments for the immediate future. However, all the factors point to a continuation of present favorable economic conditions.

Industrial processes in a mass production age offer numerous opportunities for electricity. Time and space are saved, for example, in paint spraying in a water curtain booth, using a conveyor trolley to move barrels on through a Fostoria infrared oven and on to storage or ready to fill. Electricity is in every step, conveyor, water curtain and fan, spray compressor, oven at Currier Co. Oakland

Pacific Power & Light Co. — All work of this character is on a long-range basis. There are several large housing projects contemplated and under way. A few new industrial accounts of small size are expected in 1950. We expect a continued expansion in demand for service in all classifications.

Portland General Electric Co.—No planned program. Several large housing developments are planned or under way. There is no unusually large industrial expansion in view at the present time.

Public Service Co. of New Mexico, Deming — New zinc flotation mills being erected by American Smelting & Refining Co.

Public Service Co. of Colorado— For many years, we have had an industrial development department. Its personnel has endeavored to cooperate with Chambers of Commerce, civic organizations, and individual firms in providing information concerning availability of raw products, necessary facilities, weather conditions, and other pertinent information that must be considered in connection with prospective building sites in commercial and industrial development. A few years ago, the Governor of Colorado and other prominent men of the state decided that it was desirable to create an organization to survey the assets of the state and desirable locations for various types of industry. As a consequence, the Colorado Resources Development Council was created and the Governor appointed various prominent men as members of this council. They engaged a full-time secretary, and then through the cooperation of all members, surveys in various sections of the state have been and still are being made. The information, obtained through these surveys, is then compiled into brochures, each containing data regarding a particular city or locality. In it is given information as to the availability of raw materials, transportation facilities, housing conditions, water supply, availability of power and rates, and such other data as might prove helpful. These brochures are then distributed to the respective cities surveyed, so that they may be given to firms seeking locations for new factories, commercial institutions, or branches. As a result of these surveys and the publicity and promotional advertising being carried on, quite a number of firms have established factories or branch establishments within the state. A number of others are now considering locating in Colorado.

Oil Shale development near Rifle, Colo., will result in a large number of new workers, homes, and business establishments in that area. It has been estimated that this activity will result in the addition of 50,000 new inhabitants in that area within the next five years. Another contemplated new development in the timbered area on the west side of the mountains is a wood-pulp mill. An insect has attacked and killed great quantities of Engleman Spruce. These trees are not good for lumber, but can be utilized in making wood pulp. One company has already been organized and another in prospect to bid for this dead timber, and it is predicted that construction of at least one wood-pulp mill will be started during the coming year. This development is expected to employ several hundred workers. This also will create the necessity for the building of new homes at a site reasonably close to the mill.

Ever alert to development of new uses of electricity to farming, the West has produced many. For instance, at Walla Walla, Percy Clark, dairy farmer, has dried pea and lima bean vines for feed; spreading wet green vines on a slated platform and blowing air under and through them. Pacific Power & Light and Eastern Washington College cooperated in the experiment and study of results

Puget Sound Power & Light Co.— Progressive apartment-house building.

Raton Public Service Co.—Housing program expanding rapidly; some small industrial growth.

Riverside Electric Light Dept. — Cooperation with our local Chamber of Commerce at all times in their program. A branch of the University of California will be established in the near future and will be the cause of extensive development of the eastern part of our city.

Sacramento Municipal Utility District—Close cooperation with Chamber of Commerce for new industry. Complete systematic coverage of industrials. Make recommendations for best applications, economical use and more suitable equipment. Make recommendations for best applicable rates.

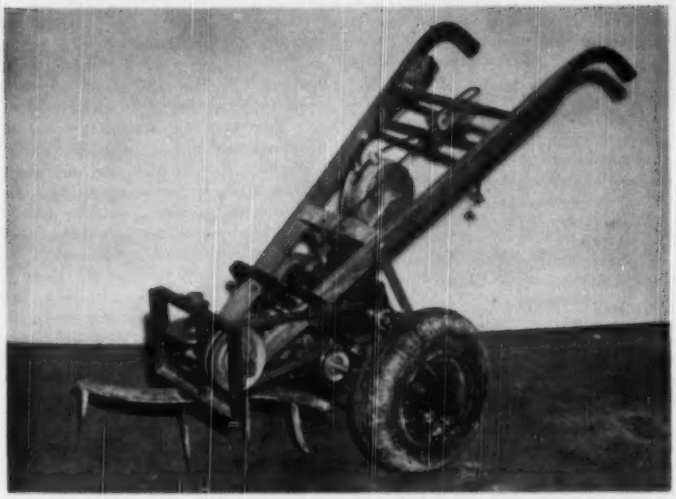
Work is started on the Sacramento-Yolo County deep-water channel which will virtually make a seaport of Sacramento. The Folsom dual-purpose dam to provide irrigation and power is also under construction.

Salt River Valley Water Users Assn. —Housing units totaling 500 are being built.

San Diego Gas & Electric Co.—Cooperate in the work of the Chamber of Commerce, industrial committee and send *Electrified Industry* and *Electric Heat in Industry* to selected list of customers. Plans are being made for a world progress exposition to be staged in San Diego probably in 1953. It is expected that the project will stimulate business activity well in advance of the date the fair actually is opened.

Seattle City Light — The industrial program for conversion of war load to civilian production is completed. Construction now in progress includes 12 apartments with 1,750 residence units, a $12,000,000 shopping center, a U. S. Veterans Hospital, a public safety building, the Federal Reserve Bank Building and others. Local banking and finance show healthy condition. General business year should exceed 1949. Consumer resistance in electrical merchandise will be overcome by more intensive selling to develop new markets.

Development of irrigation and power in the Columbia Basin stimulates



A litter loosener for stirring deep litter pictured here is only one of a multitude of devices and methods developed through the years by the experimental laboratory of Puget Sound Power & Light Co. at Puyallup, Wash., to aid its farm customers to lighten the work, make more money and lead a better farm life. Development of uses has been as important to farming as running of lines

activity in both eastern and western Washington.

Sierra Pacific Power Co.—Cooperation with Chamber of Commerce.

Southern California Edison Co. — We have 52 power consultants and four power engineers who assist individual industries wherever their services can be used. Lever Bros. are building a new $25,000,000 plant for the manufacture of all their products, located in the Montebello area.

Southern Colorado Power Co. — Lighting and modernization of power use is being promoted. There is increased new activity at the Colorado Fuel & Iron Steel Plant and at Pueblo Ordinance Depot and many smaller industries.

Southern Utah Power Co.—Nothing special — close contact with present customers and development of prospects. There is a large amount of residential housing construction. 1950 should be a year of good growth.

Southwestern Public Service Co.—Limited industrial development program. Eight hundred housing units under construction at Walker Air Force Base.

Tacoma Department of Public Utilities — One industrial engineer. Program limited because of power situation.

Utah Power & Light Co.—While no definite activity has been set up in our company under this name, we do considerable work along these lines. The Atomic Energy Commission project in southern Idaho will affect business conditions, housing, etc. We predict that business in the electrical industry in our territory will show an increase in 1950 over 1949.

Washington Water Power Co. — Customer relations improvement of customers efficiency. Grand Coulee Basin development and local mining developments are important.

Agricultural Electrification

Because of the aggressive programs of many Western utilities the electrification of farms in the eleven Western states is higher than anywhere in the nation. What these companies are doing to further this work is briefed in these words:

B. C. Electric Railway Co.—Our agricultural program is not classified as a power program. There is very little 3-phase power used in agriculture in this area, more requirements being for motor loads not over 5 hp. and for heating loads in the poultry industry. Large-scale irrigation is starting to take hold, but even in these cases pumping will only be from nominal depths and not deep-well pumping as known in other areas. (This company maintains agricultural electrification consultants, issues a farm news bulletin to its farm customers and does an excellent job of promoting electrification of the farm.) The Victoria division also has an agricultural representative who is a qualified agronomist.

California Electric Power Co. — Yes. Free pump testing and irrigation advisory service.

California-Oregon Power Co.—Yes through retail dealers.

California-Pacific Utilities Co.—Intensive program designed to extend electric service to all rural customers in the company's service area.

Central Arizona Light & Power Co.—Yes, one consultant calling on irrigation customers.

Coast Counties Gas & Electric Co.—Yes, an agricultural power specialist who contacts rural accounts, farm advisors and vocational agricultural classes.

Hawaiian Electric Co. — Included with industrial program.

Idaho Power Co.—Promoting all agricultural services by direct contacts, newspapers and radio advertising.

Pacific Gas and Electric Co.—The PG and E agricultural power program is designed to satisfy customer demand for new service, to continue with the presently established essential services to existing customers, and to improve dealer and customer relations with the company.

Pacific Power & Light Co. — In chief agricultural areas served we make calls to offer help on farm problems.

Portland General Electric Co. — Maintain agricultural advisory service.

Public Service Co. of Colorado—Our agricultural program is briefly as follows: Rural development objectives are two-fold. They assist farm customers to attain better living and greater profits from the increased use of electric power, and thus make the company's rural investments economically sound. They provide appropriate participation by company representatives in grass-root farm activities to strengthen and improve company-farmer relations.

The program includes a farm service specialist in each district having a substantial agricultural service area. These men, through individual farm contacts, provide practical and technical assistance to farm customers. They provide program assistance and meet with local farm groups such as granges, 4-H clubs, farm bureaus, etc.

Direct mail information to company farm customers through *Electricity on the Farm* magazine and feature articles in farm publications.

Experimental (on the farm) applications of electricity to new farm tasks with subsequent distribution of information on beneficial results. An example is electric soil heating of hot beds for early Colorado pascal celery doubled the growers' profits.

Carry on cooperative work with Colorado A&M College, Colorado

Farm Bureau, Chambers of Commerce, Rocky Mountain Electrical League and other state level groups in the interest of general agricultural development.

Public Service Co. of New Mexico, Deming—Service 313 farm customers for irrigation pumping and residences.

Puget Sound Power & Light Co. (This company which pioneered in rural agricultural electrification and for years maintained an outstanding agricultural experimental laboratory at Puyallup, now reports no agricultural program because of condemnation proceedings and negotiation for sale of the properties.)

Sacramento Municipal Utility District—Conducts over-all plant efficiency tests on agricultural pumps. Present wiring and farm equipment demonstrations before rural groups.

Salt River Valley Water Users Assn.—Yes.

San Diego Gas & Electric Co.—Advertisements in farm magazines and rural newspapers, *Home on the Ranch*, a radio program, two 15-minute periods per day. Visual education department cooperates by showing pictures at farm meetings. Assists in promoting work of committees on relation of electricity to agriculture. Will send *Electricity on the Farm* to a list of 1,000 customers next year.

Seattle City Light — Distribution system serves city of Seattle in environments in which usage of energy is predominantly residential, commercial and industrial.

Southern California Edison Co.—An agricultural advisor working with power consultants to assist 4-H clubs and other farm groups on program material.

Southern Colorado Power Co.—One full time rural development engineer.

Southwestern Public Service Co., Roswell—Limited. Approximately 700 irrigation pumps operated in this area.

Utah Power & Light Co.—Not to any extent.

Washington Water Power Co.—Assisting farmers in problems of electricity to agriculture.

Bed Covering Promotion

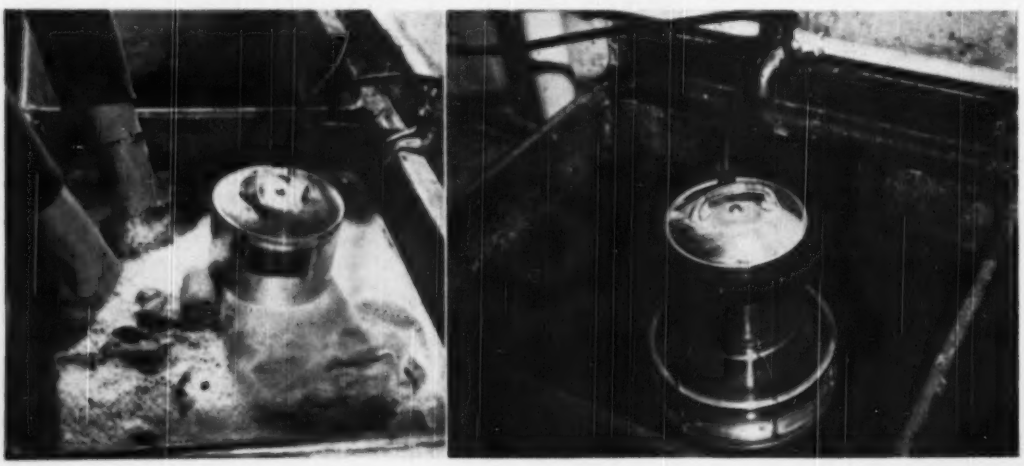
All electric bed covering received a promotional boost in six central Utah counties where Telluride Power Co. engineered a new time-payment plan for its customers — $2 per month to be paid with the electric service bill. Although it no longer merchandises, Telluride Power continues to assist dealers in pioneering new appliances. From this bed covering campaign, which ran from Nov. 1 to Dec. 24, the following technique was developed which can be used elsewhere in similar campaigns:

The utility promotes all makes of electric blankets, comforters and sheets, but sells only Westinghouse sheets, since the price is low enough to allow a monthly $2 payment to be paid out in one year. So that all dealers can offer the same time-payment plan, the company purchases the dealer's time payment contracts covering Westinghouse sheets, with the provisions that the credit of the purchaser is acceptable to the company, that he is receiving service from the utility and that the contract is written on a power company sales agreement.

Since the term price of the sheet is 10% higher than the cash price, the company purchases from the dealer all acceptable contracts at 10% discount from the undue balance. The dealer explains to the customer that he is to pay $2 per month with his service bill, but that the power company will allow a 10% discount on the undue balance at any time the purchaser wishes to pay the bill in full.

Starting with a folder mailed to each family using electric service, Telluride Power followed its promotion with newspaper advertising and radio spots. Dealers are offered the use of the power company's windows for displaying any make of electric bed covering. The company further offers sales training help to all dealer salesmen. Through the cooperation of Westinghouse Electric Supply Co. any dealer employee or power company employee is given one electric sheet as a bonus for every ten sheets he sells.

High-frequency sound waves stir up the water in this new "electrosonic" washing machine which will soon be put on the market by Excell and Jones of Melbourne, Australia. After soap powder is placed in the water, the power is turned on. A humming vibration creates waves of bubbles in the water that turn into a foaming liquid, as seen below. Clothes are placed around the machine in the wake of the waves created by the sound. Tests revealed that clothes were clean after ten minutes in the water. Picture at the right shows the device as it is first placed in the tub with the cord connected but switch turned off. The machine stands 16 in. high and about 8 in. in diameter



ELECTRICAL WEST Sales Guide News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

February 1950

Color TV was quite successfully previewed in San Francisco. Color Television Inc., local concern, using an electronic and optical method, single tube, differing both from Columbia's pin-wheel and RCA's three-tube; invented by young George Sleeper, Jr., relayed from studio KPIX, picked up on modified projection sets at the Emporium in color, in black and white anywhere else. Worried local dealers with big stocks of b&w sets on hand asked Arthur Mathews, CTI president, to play it down. He did, but crowds jammed the Emporium auditorium to see. Results, not perfect, were comparable to early Technicolor. System seems to have all advantages FCC asks; adaptability to present sets, use of single channel, picture reception in black and white on all sets, low conversion cost. CTI will be demonstrated to FCC in February for go-ahead.

Color here

Lots stirring the past three weeks—Chicago Market, TV prices tumbles, new model showings, San Diego annual winter conference, San Francisco Market—all with surprises, competitive angles to make 1950 anything but dull.

Surprises

Chicago Market wasn't a record in attendance but had good buying, high optimism. Admiral, Motorola and Philco saved their Sunday punch for it, lowered the boom on TV and refrigerator prices, caught others with their tubes down. Others hastened to meet them, kill off any price advantage. (Good thing there's not much inventory around). One new manufacturer made two reductions quick but still wasn't competitive with a brand new set. New low level established 12-in. tube table models at around $195. Rectangular tubes got the play.

Lower the boom

Shown at Chicago and San Francisco Markets and by now in many dealer meetings throughout the West, were these:

Markets

Westinghouse set a new style-price tempo with its knee-hole desk Rancho range at $159.95 for small kitchens, housing, etc. Also came back in the field with a side-opening dishwasher and sink; featured a defrostless refrigerator. Company loaded all its Western appliance people on streamliners to Mansfield, led by J. J. Moffatt, for a sales briefing on the new stuff.

Range

Universal (Landers, Frary & Clark) introduced the newest idea of all—three modules, a four top element section, an independent oven, and steel drawers, and you can arrange them in any combination you want. Called appropriately, Select-a-range, it is an architect's delight, high-oven fan's prayer answer.

Modules

Wide open

Frigidaire's newest thing in ranges, introduced among other products at a series of the most spectacular shows ever, is a 30-in. range with a wide 28-in. oven at $169.75. Also showed a range of refrigerators from 4 to 17 cu.ft., freezers, air conditioners, kitchen cabinets, laundry, water heaters, etc. But the real emphasis was on selling, dramatized by a troupe of professional and factory actors. The Western troupe was headed by W. L. Buchanan of San Francisco.

New twist

Admiral distributors, like McCormack & Co., showed the new lower priced TV line, rectangular tubes, featured as well as the electric range now equipped with Flex-o-heat control on all surface units and revolving self-basting rotary roaster; Dual-temp refrigerators at new low prices, a 7-ft. Master at $189.95.

Thru glass

Philco, besides its TV and refrigerator new models, sprang something new in electric ranges. A heat resistant glass panel is inserted under the broiler coils to keep splatter from burning. Infrared heat goes right through. All trace of former Electromaster ranges now converted to Philco styling.

Bouncing glass

Apex Rotarex called its distributors from 11 states to San Francisco Feb. 3, to get the pitch on the 1950 line. Lou Stull, Western division manager, was host. Frank Ryan, advertising manager, Henry Strom, product sales manager, and Herb Cooper, from the ad agency, were out from the factory. New--a glass fiber and plastic basket in the automatic washer; a new Waste-a-Matic garbage disposer; plastic coated racks in the Dish-a-Matic to protect dishes and glasses from chipping or marks. Improvements in all the line.

Neat

Hotpoint, having brought out its line earlier, showed only a new cabinet ironer at $99.95 and an 11 ft. freezer. Howard Scaife says Hotpoint will now have its own refrigerator factory, thus becoming still more independent of the monogram. In spite of others springing lower priced ranges, Hotpoint finds its deluxe models still selling best; dishwashers are going to town.

Other news

Something new at Chicago mart--Murray Corp., which has been making appliances for Montgomery Ward, blossomed with a full new line of gas and electric ranges, sinks, cabinets, etc. . . New at Los Angeles market, Western Stove Co. brought out a gas range with a television set in it so Mom wouldn't need to miss the program while getting dinner. (TV had to be electric though). . . Midwest Mfg. Co. showed at Chicago a combination sink and 5.5 ft. refrigerator at $286.50. . . Rainier Co. of Minneapolis, maker of water softeners, announced a full line of refrigerators, freezers, ranges, water heaters, clothes dryers, washing machine, cabinet ironer. . . ABC did not show its new automatic washer because distributors rebelled unless it was in production. Select few got a peek at model in a hotel room (washing machine, that is). . . Bendix Economat got a big play with its new models too.

First 16

Hoffman Radio of Los Angeles met Eastern price drops with its new models. Has new office, service shop and warehouse, 1339 Mission, San Francisco now. Shows the first 16-in. rectangular tube on the coast; dropped its prices about $50 on combinations with 19 and 16-in. tubes.

No case

Salt Lake City case, brought by Uptown Appliance Co. against dealers and distributors was decided "no cause for action" by jury, Feb. 4.

More than 600, only 75 of which were outsiders, made the annual winter conference of San Diego Bureau of Radio & Electrical Appliances the biggest yet. Story next month, but news of appliances reported at manufacturers' product quiz included: Jack Booth, Proctor, promised the steam iron in 90 days. . . Lou Willis, Admiral TV, said longer discounts in TV are not in the picture; dealers must make money on volume. . . Earl Rogers, Arvin, "a new fan heater with 600 cu.ft. per min. capacity, 1,320 watts, coming out soon". . . Jack Pollon, Amana, said sales up 30% in 1949, all increases in upright freezers, still their best item; 90% sales made by 25% of the dealers. . . Les Nielson, Coxy, announced its Minute Maid portable dishwasher, originated in Los Angeles, will be in production in February, in dealer hands in March. . . Dick Paige, Thermador, said steel shortage is again creating the biggest grey market in history. Thermador's range was pictured on front cover of House & Garden in February. . . Bob Lewis, Whirlpool, says there's a Whirlpool dryer coming soon. . . John Ryan, Sunbeam, declared Sunbeam has an automatic electric egg cooker coming in two months for one to six eggs at a cook.

San Diego briefs

Thor is having a laundry dryer made for it by Lovell Corp. and will have it on the market soon.

Dryer

Seth Thomas has an improved Medbury electric Westminster chime clock with larger dial, black numerals and hands, encased in mahogany. Sells at $47.50, plus tax.

Chime clock

Hood & Cies, California distributor for Tele-tone radio and TV, have appointed Tommy Tucker as metropolitan sales representative for the Los Angeles area.

Named

Hamilton Beach will use national advertising to plug its food mixers, now equipped with Pyrex Ware mixing bowls.

Ads

Motorola has a new multi-play automatic record changer which will be used in all its combination sets. Needle is designed for all three speeds.

New changer

Turnquist Bros. Co., Los Angeles, are newly named distributors for the TV and radio receivers made by John Meck Industries.

Franchise

Noblitt-Sparks Industries is offering a five-year service warranty on both the Arvin dual control No. 2300 iron and the automatic 2200 iron.

Warranty

Knapp-Monarch's silver anniversary year will be the theme for its 1950 advertising. Will use special promotions headed by a two-burner, table model stove to retail at $7.95.

Anniversary

Ben Rohwedder has joined the staff of Thompson-Diggs Co.'s appliance department, San Francisco, as service supervisor. He was formerly with McCormack & Co.

Change

Surprise of the month was resignation of G. H. "Rock" Smith from Deepfreeze to enter a consulting service. His successor is treasurer of parent company, L. J. Sorensen. The move boosted Ben G. Sanderson, well known out West here first as Electromaster, then Deepfreeze district manager, to be general sales manager.

Moves up

TV sales hit 47,041 in December for the Los Angeles area, reports the Electric League of Los Angeles. Total estimated receivers covered by Los Angeles signals as of Dec. 31 was 349,676. — Still climbing

G-E is making a new line of small appliances, including two irons and fans. Will make the irons at the Ontario, Calif., factory, to sell at fair traded prices of $8.95 and $9.95. Is stepping up production to fill back orders and meet an expected 5% increase in this year's business, says H. Gordon Smith, Pacific district manager of the appliance department. — New line

Cory says it will continue its "guaranteed against breakage" glass coffee brewer sales campaign with increased advertising during 1950. Will pack guarantee cards with the coffee brewers at the factory instead of handling distribution through the mail. . . Has a new 12-pack display carton for the Cory glass filter rod. Top folds back into a two-color illustration with the rod fitting into slots showing it in its working position. — Carry on

Fresh'ned-Aire has a new three-purpose window fan. Special window bracket adjusts to fit any standard window. Can be used as an intake or exhaust fan. Power unit is removable for use as a cooling fan. . . Is also making a three-speed electric circulator, styled to look like a coffee table. Comes in two-toned green-grey and yellow plastic and retails at $47.50. — Three way

Gibson is using special promotion and newspaper ads to introduce its "special refrigerator model," an 8 cu.ft. box with redesigned interior and the major Gibson features. Has a newly designed glass top crisper drawer. Suggested price is $249.95. — Special refer

Shavex is a small plastic plug-in device which fits into any outlet and converts a-c to d-c for a quicker shave with any electric shaver. Announced by the Bing Crosby Research Foundation, made and sold by Shavex division, Electronic Specialty Co., Los Angeles. — Converts

Packard-Bell has started this TV servicing plan in Los Angeles, will later bring it to San Francisco and Portland--Central switchboards are set up to take trouble calls and factory-employed servicemen are dispatched to the scene. Plan is financed by the owner's purchase of refundable warranty, which can be included in the cost of the set and included in term payments. Warranty lasts two years. Unused portion is refundable. — TV servicing plan

Blackstone introduced its 1950 line with new models and lower prices. Has a new family-size washing machine priced under $100, a portable ironer with stainless steel shoe, knee and finger-tip control. Washer model 130A has been reduced $10. — New and lower

Electrovox Co. is putting out a new truncated design phonograph needle tip which plays both microgroove and standard play records. — Plays both

Ironrite Ironer Co. has changed its name to Ironrite Inc. — Change

A-B Stoves is showing its new line of Aristocrat electric ranges, topped by a twin-oven model with Pyrex windows. Ovens are individually heat controlled. — Twin oven

Quick Catch-up

IES

What the lighting certification programs mean and how they are administered was told both the Southern California and the Northern California sections of Illuminating Engineering Society by two people closely associated with these programs—Leonard Hobbs, Smoot Holman Co. vice president and secretary of the RLM Standards Institute and advisory board member of Fleur-O-Lier Assn. and NEMA Lighting Section, and Caroline Horn, in charge of the Electrical Testing Laboratories photometric section. The Los Angeles meeting was Jan. 4; that in San Francisco Jan. 12.

Hobbs said that because of lack of standards and principles the home lighting industry has practically destroyed itself. Cheapening of product, lack of sound engineering design and lack of consideration for the customer had run the business into its present low state. The commercial and industrial lighting industry wants to keep the industry a good industry and to do so must keep faith with the consumer. Appearance alone cannot be used as a guide in dealing with a complicated light source like fluorescent.

Hobbs differentiated between the minimum safety standards which Underwriters' Laboratories are concerned with, the ASA standards which deal with interchangeability of components and parts, and the certified standards such as CLM for floor and table lamps, Fleur-O-Lier for commercial lighting and RLM for industrial lighting equipment.

Just returned from a meeting of the RLM Institute, Hobbs announced new specifications for two- and three-lamp 96-in. and 72-in. slimline industrial fixtures, changes in the 40-watt fixtures to permit instant-start ballasts and lamps, ballast enclosure changes and elimination of the 75-watt incandescent fixture because of reduction in 75-watt lamp size.

The ballast situation, Hobbs said, is badly upset. Temperature problems and explosions of ballasts have given manufacturers great concern. So far UL approval has not been given to any ballast for slimline fixtures recessed in a ceiling because of the temperature problem.

Miss Horn credited the IES lamp with resultant improvement in cords, switches and glassware because none were available that would meet the requirements. The IES lamp, she said, had exceeded 5,000,000 in sales and had made the entire country light conscious. To make certification succeed, she emphasized, products for the public must be better as a result and in all the lighting equipment now certified better products are guaranteed the public. She then illustrated by means of lantern slides the testing procedures at ETL on RLM, automobile lights, Fleur-O-Lier, ballasts, starters, CLM lamps and even an eyeball testing machine for opthamologists.

Those interested in lighting throughout the West are bringing their eyes to focus on the 1950 National Technical Conference of the Illuminating Engineering Society which will be held at the Huntington Hotel, Pasadena, Aug. 21-25. D. W. Prideaux, General Electric Lamp Dept., Los Angeles, is chairman of the conference executive committee and has appointed a number of assisting committee chairmen to take care of various phases of the arrangements.

The executive committee itself, headed by Prideaux, has on it Edward Balogh, Leonard Hobbs, Roy Dahlin, S. H. Simonsen, Leonard Towner. Committees for various phases of arrangements are in charge of: A. B. Smedley, hotel; J. Walter Howard, local publicity; J. M. Smith, transportation; Don Grandy, finance; W. J. Rashleigh, entertainment; Louis D. Black, lighting display and decorations; M. A. Cabot, attendance, and Mary Louise Salcido, ladies' entertainment.

It is still too early to announce any program features, but it is certain that the latest knowledge relative to illumination in all fields of activity will be discussed or displayed there. This will be the first far Western convention since the 1939 one in San Francisco.

Inspectors

New Mexico's chapter of the International Association of Electrical Inspectors held its second annual consolidated meeting of inspectors, contractors, wholesalers and journeymen, at the Hilton Hotel, Albuquerque, Jan. 13-14. More than 229 were registered for the two-day business and social function that brought the electrical industry of New Mexico together.

A short business meeting Friday morning opened things. Chairman E. S. Butt presided and the main topic was a mid-year meeting in July during the time of the meeting of the State Electrical Board. Such a meeting was voted. Officers, too, were elected for 1950. Elmer Kaemper was elected chairman. He is a member of the Electrical Administrative Board from Las Vegas, N.M. R. L. Thompson, engineer for the board, Albuquerque, was elected vice-chairman; Elmer Zemke, chief inspector of the board, was named secretary-treasurer.

The afternoon session began with a code discussion session, led by Victor Moulton, Mountain States Inspection Bureau, Denver, and secretary of the Rocky Mountain Chapter. Harry Davin, Bussman Fuse Co., followed with an illustrated lecture and demonstration of Fusetrons, their characteristics and applications. The afternoon program also contained a talk on lighting equipment and louverall ceilings by A. E. Swedenborg, Benjamin Electric Co.

On Saturday Bud Etsinger, construction materials department, General Electric Co., described and demonstrated remote control systems for residential lighting. Code discussion was resumed after that, and then followed an afternoon program of speakers.

Harold Vaugh, Cutler-Hammer Co., Denver, showed a movie, *Everybody Wins with Multibreakers*. Hollis Johnson, Appleton Electric Co., Dallas, talked on the applications of explosion-proof fittings. E. S. Reed, U. S. Rubber Co., demonstrated and explained the installation of Uskon radiant heating panels.

The social program included a banquet Friday evening, over which Vic Moulton presided as toastmaster. Ernest W. Everly, chairman of the commission of the City of Albuquerque, welcomed the group to the city. The principal speaker was Joseph M. Montoya, lieutenant-governor of New Mexico. He summarized the progress and the problems of the state electrical law and the administrative board.

Another code discussion session was held Sunday morning, several questions being brought up for answer to final satisfaction.

Entertainment was furnished by William Lawrence of State Electric Supply and Ray Bygel of Electric Supply Co., who held open house Friday and Saturday. Lawrence also provided a cocktail hour before the banquet and a ladies' luncheon, Saturday. Korber's Electrical Department, General Electric Supply Corp., and the above mentioned wholesalers helped with banquet and dance expenses and provided door prizes. The dance was held Saturday evening.

Exhibits and displays of electrical materials were located on the mezzanine and in the Pueblo room of the hotel during the entire affair, giving manufacturers and distributors an opportunity to show new materials and equipment to the 41 contractors,

13 inspectors, 6 utility, 9 engineer, 38 journeymen and 51 manufacturer and distributors' representatives present.

Oregon Chapter, IAEI, at its December meeting decided to hold meetings monthly, the next in Salem, Jan. 13. Report of the latter has not yet been received. The prior meeting, led by O. T. Fugitt, chairman, featured questions written in to the Fact Finding Committee for answer. These covered service attachment, grounding of boxes where non-metallic wiring system is used with foil plaster board, number of disconnecting means that should be permitted for a 4-wire, 3-phase combined light and power service, requiring of fixture studs in wall outlets in residences.

Southern California Chapter, IAEI, meeting at Ventura, Jan. 25, promised to be lively too. The proposed California Electrical Safety Orders were to be reviewed and discussed. Report will be given next issue.

Several high potential subjects made the atmosphere crackle at the Northern California Chapter, IAEI, meeting, Jan. 21, held at PG and E Co. steam station P, at Hunters Point, San Francisco, Walter Keller presiding. The meeting included a tour of the huge new steam plant conducted by Jud Callahan and PG and E engineers. The attendance was exceptionally large despite bad weather.

Topics drawing verbal fire were: The Pacific Building Officials Conference proposal to write a condensed code of its own as part of the uniform building code (action was delayed awaiting the outcome of a move by NFPA to provide a condensed version of the National Electrical Code for use in small cities); grounding vs. insulation of washing machines, and whether an automatic washer is a fixed or a portable appliance; using meter sockets in multiple as wireways; inconsistency of grounding fixed bathroom heaters and not grounding portables used in bathrooms; the need for reinspection.

But there was no controversy when R. W. Maxwell expressed inspector concern over the abuses possible in permitting the new type of clip-on or insert circuit breakers into a panel. He said that since the 15-, 20-, 30-, 40- and 50-amp. breakers are of the same size and shape and have the same means for connection quickly to the buses, the inspector has no way to know that an appliance salesmen, eager to sell an appliance, will not substitute a larger breaker in a panel than the wire size will carry safely and create a serious hazard. He presented a resolution that was voted unanimously that Underwriters' Laboratories reconsider approval of such assemblies and require that the breakers not be interchangeable if rated over 20 amp.

Fred Straus, speaking as an engineer and for himself, read a letter that he has addressed to the California Division of Industrial Safety again urging adoption of the NE Code by reference with such amendments as desired instead of rewriting the entire code into a separate set of Safety Orders.

Bernard Weissinger, San Francisco inspector, was elected chairman; Prentice Wilson, Santa Rosa, vice-chairman and Ken Bliss secretary-treasurer for the new year. The next meeting will be held at Richmond, March 18.

Memberships by cities has been approved by the Executive Council of the International Association of Electrical Inspectors. The proposal for such memberships came from Herbert G. Ufer, secretary-treasurer of the Southwestern Section, who had found that cities held substantial memberships in other associations of building officials. The new membership dues for cities will be based on population and will include the membership of the chief electrical inspector or head of the department. It is advocated that each city also pay the dues of its inspectors at the same time.

Contractors

With the cooperation of electrical manufacturers and their representatives, the Electrical Contractors Society of Washington, Inc., is sponsoring and booking "road shows." These shows are made up of 12 displays, accompanied by manufacturers' representatives to explain them and four or five short talks are made at each stop. The speakers rotate, no one having an advantage over others.

The first show was held at Olympia in November and was purely experimental. It was so well received that plans were made at a meeting at the Washington Press Club to cover the state with more such shows. Two contingents or troupes were set as the goal, to cover the state about once a month.

Itinerary for shows included Tacoma, Everett, Mt. Vernon, Bellingham, Bremerton, Aberdeen, Chehalis, Vancouver, Wenatchee, Ellensburg, Yakima, Pasco and Walla Walla, and Seattle sometime in February. The meetings are informative, educational and entertaining. Talks on lighting and adequate wiring supplement the sales talks from the manufacturers. Other subjects covered are estimating, credits, collections, merchandising. The shows were conceived by Arthur Siegal, president and T. Ralph Neilson, manager of the society.

NECA

New Montana Chapter of National Electrical Contractors Assn. held its first annual banquet and election at Placer Hotel, Helena, in December. Although both the governor and J. Everett Collier, Denver contractor who is vice-president of District 8, had hoped to be present, neither could be there. S. David White, chapter manager, presided.

W. C. Blanchette, secretary to Governor Bonner, expressed a favorable attitude toward the association and its efforts for a state licensing law and legislation for the electrical industry. He emphasized that a licensing law will protect the future of present contractors as well as that of young men anticipating entering the electrical business. He felt too that it would clear the way for better and safer wiring. He concluded by offering the services of his office at any time.

Jack Fisher, NECA field representative for District 8, outlined the relationship of the NECA head offices with various chapters. He commended the Montana Chapter for progress made thus far. He explained that NECA is not concerned with the size of the contractor's business but his competence. The various publications and services members receive from NECA were described and Fisher concluded with a review of some details of the Houston convention.

Carl Fehr, president pro-tem of the chapter, discussed the need for the formation of a chapter in Montana, commending the efforts of Don Larson, manager of the Rocky Mountain Chapter in helping the chapter get under way. He had attended the 8th District meeting at Denver, he reported, and had been impressed by the attitude of the group and the work accomplished. He had met with Paul Geary, NECA executive vice-president, and had discussed with him possibilities of a Montana chapter.

A contractor's responsibility to the public was emphasized by Fehr. A contractor, he said, must not think only of himself. He must be qualified to do competent work; safety must be stressed and the public protected from unqualified contractors by good licensing and inspection. At his suggestion, a question and answer session followed in which all present were enabled to clear up any questions on their minds relative to NECA and chapter work.

Election of officers followed and by unanimous vote the pro-tem officers

were elected to their respective offices, as follows: Carl Fehr, Billings, president; William Cissel, Livingston, vice-president; George Linville, Billings, secretary; P. T. Westbrook, Billings, treasurer. Board members were also elected and officers and board met the next morning at breakfast. The feelings expressed indicated that all were enthusiastic and interested in the future of the Montana Chapter.

Important changes in District 6 happened in January. Robert Higgins, who was E. R. Cornish's assistant as field representative for the district, was made field representative for Ohio, West Virginia and went East immediately. A successor is under consideration but has not been announced. The Spokane Chapter also made a change. Paul Heydon, for years its manager, will now concentrate his efforts as manager of the Northwest Line Constructors Chapter, and Robert L. Wilkinson, manager of the Inland Empire Electrical Dealers Assn., will enlarge his activities to become the manager of the Spokane Chapter as well, and new offices will be opened soon for both organizations. The District 6 meeting is scheduled to be held in Spokane, May 11-12.

California-Nevada Line Constructors Chapter is now a going concern. It held a board meeting at the time of the California Conference of NECA Chapters meeting at Fresno, Jan. 20, and elected Gerald Petersen, Petersen Engineering Co., San Francisco, president; Al Eddy, Ets-Hokin & Galvan, San Diego, vice-president; B. A. Solomon, Del Monte Electric Co., Oakland, treasurer and Charles Wykle, Schuman Electric Co., Los Angeles, governor. Bylaws were approved and E. R. Cornish appointed acting chapter manager. Oscar Chagnon and Gerald Petersen were named directors at large. Other directors are selected by the various chapters of NECA in the area. The Bureau of Reclamation will be asked for a meeting similar to that held in December in Portland with the Northwest Line Contractors Chapter.

Rocky Mountain Chapter, NECA, recently elected Karl Krummel as its president, to succeed Paul Jussel. Dave Sturgeon and Bert Stiles were added to the board of directors due to increased membership. The Colorado Springs Section elected Harold Chase its president, Herbert Wilson vice-president, Matt Whitney secretary-treasurer, Simon Halle, member at large on the board, and James Berwick and Winston Whitney on the board. Charles Redman of Pueblo now represents that section on the Chapter board. The Wyoming board members are Francis Fitch of Cheyenne; Charles Pope, Laramie; George Forster, Casper. Don Larson is manager for the chapter, whose offices recently were moved from the Boston Building to 26 Shuey Building, 1460 Pennsylvania St., Denver.

Edgren

Los Angeles Chapter, NECA, re-elected Sid Hill as its president at its recent annual meeting; R. F. Doll, Glendale, vice-president; A. L. Stone, treasurer and Herb L. Evans, governor. The directors are H. R. Vancott, C. D. Draucker, Max Fry, J. B. Shamel, Richard Arbogast and R. R. Jones, Pasadena. Fred J. Ortiz, chosen outstanding apprentice in District 6, was presented an award. Speakers were Ed Buttner, who told of contracting in England, J. D. O'Connor, Sacramento, recently elected District 6 vice-president, and Ralph Rutledge, state apprenticeship supervisor, George Ellicott, IBEW local No. 11 manager, John Strickley, apprenticeship coordinator, J. E. McDonald, joint apprenticeship committee, and E. R. Cornish. Warren Penn, chapter manager, gave a review of the year's activities.

IEEDA

Inland Empire Electrical Dealers Assn. elected new officers at its recent board of governors meeting in Spokane, and at the same time announced new leaders of the various IEEDA chapters.

Claude Edgren of Colfax, Wash., takes over as president of the association, succeeding R. W. Burch, who continues to serve on the executive committee. Stanley Densow, Spokane electrical dealer, is the newly elected vice-president, replacing Edgren. Other association officers remain the same: F. A. Tool, secretary; W. J. Maghan, treasurer; Robert L. Wilkinson, executive secretary.

New leaders of the various chapters:

Coeur d'Alene Chapter: Robert Whiteley, Whiteley's Electric, president; Al. Barrett, City Electric, vice-president; Gordon DeFoe, Washington Water Power Co., secretary; Earl N. Dawson, Cope Electric, governor-at-large; R. W. Burch, R. W. Carlson, Charles Polston, E. A. Kreig, directors.

Lewiston Chapter: Harley Steiner, Steiner Radio & Electric, president; Paul Schurman, Schurman-Wasemen, Clarkston, vice-president; J. J. Fox, Washington Water Power Co., secretary-treasurer; Melvin Stewart, Lewiston Refrigeration, governor-at-large; Coy Barnes, John Nanninga, Bud Bartlett, Carl Harris, directors.

Palouse Chapter: Willis Shaver, Shaver Electric, LaCrosse, Wash., president; Byron Henry, Pullman Appliance & Music, Pullman, Wash., vice-president; L. A. Winn, Washington Water Power Co., Pullman, secretary; J. B. Williams, Williams' Firestone Store, Colfax, Wash., treasurer; Claude Edgren, Colfax, Wash., governor-at-large; Joe Brunzell, S. C. Haddock, Joe Cada, directors.

Stevens Chapter: Vern Barney, City Electric, Colville, Wash., president; John Kinkaid, Valley Electric, Chewelah, Wash., vice-president; R. T. Paine, Washington Water Power Co., Colville, Wash., secretary-treasurer; J. W. Bouska, Bouska Hardware, Chewelah, Wash., governor-at-large.

Spokane Chapter: M. E. LaCounte, Columbia Electric, president; Lloyd Distad, Lloyd's Sales & Service, vice-president; F. A. Tool, secretary; Lester Barnes, Maxwell's, treasurer; John F. Boothe, Brown-Johnston Co., governor-at-large; E. S. Bergquist, Stanley Densow, W. J. Maghan, directors.

Big Bend Chapter: T. H. Bonk, Edgren & Cox, Sprague, Wash., president; Clarence Kissler, Kissler's Appliance Store, Odessa, Wash., vice-president; F. J. Williams, Washington Water Power Co., Davenport, Wash., secretary - treasurer; Charles Breitkreutz, Ritzville, Wash., governor-at-large; Robert Hopp, Fred W. Denson, Earl Snyder, Roy Kirby, Thomas Underwood, directors.

EMEA

Free admission tickets for the fourth industrial electrical show, March 15-18, at the Shrine Convention Hall in Los Angeles, will be made available around the middle of February, announces the Electrical Maintenance Engineers Assn. of Southern California, sponsors of the exposition. Tickets will be distributed by exhibitors, electrical manufacturers and distributors, and the association.

ELECTRICAL WEST

Good Record — Good Outlook

BULK of this issue is devoted to our annual stocktaking of the electrical industry here in the West. And the mid-century report is good. It is highly significant that the region, with only one-eighth of the nation's population, now represents one-fifth of the electrical market. This is a tribute to the electrical industry for its foresight in providing an adequate supply of power at low rates, and for its initiative in selling the advantages of electric service to the public. And it is equally flattering to Western people because of their willingness to accept and use this service.

The record for 1949 is one of sustained growth in keeping with the dynamic economy of this region. More new capacity was added to power systems than ever before in a single year. Customers and use reached new peaks. And the total volume of electrical business exceeded that for any previous twelve-month. By all gages 1950 will do equally well. There is still a huge unsatisfied demand for electric service. Power reserves have not yet been built up to a safe minimum. And the potential growth in many fields of use has yet to feel the stimulus of good solid salesmanship.

We commend the individual reports for study. They offer convincing proof that the West is the best electrical market in the country.

Big Government Again

BEFORE any super-power bureaucratic electric grid blankets the Pacific Northwest, the people of that region should take a good look at Nebraska. They will find that bureaucracy can and does indulge in many of the transgressions charged to private power companies by the public power zealots. There is one distinct difference. The people have trouble in displacing government.

Take the case of Bridgeport, Nebraska. Apparently the people there don't like the service or the treatment accorded by the Consumers Public Power District. So they voted bonds to buy or build a local distribution system. The city's right to issue the bonds is being questioned by every legal means at the disposal of the state-wide public power agency. The matter is now in the courts with the likelihood that it will go clear to the state supreme court.

We like the succinct comment of one Nebraska county editor: "Apparently Consumers doesn't approve of all public power."

Too Many Codes

INSPECTORS have been agitated of late by a drive on the part of building officials and city managers to absorb them and their electrical department, into the building department, and to blanket the electrical code into a uniform building code, much simplified. Whereas this has been the form of organization in a great many cities for years, it is a drastic change for those in which the electrical department was an important one in itself and usually embraced street lighting, signals, fire and police alarm systems and radio. In the new organization the latter are lodged in public works or street or police and fire departments and the electrical department becomes merely one for inspection of wiring.

As such the inspector may find himself bossed by a carpenter, plumber, engineer or even firemen. He is further worried because his electrical code is under attack. If it is a personal creation, it is under greater pressure for change than ever.

How much of this is due to inspectors themselves in neglecting to do a public relations job or in creating public confusion and impatience because of differences in local codes? When the populace was static, living under a local code that was different from a neighboring one meant little. But the war stirred up the population, moved it around, created housing shortages. As people had to build new homes they became aware that building codes were so unlike, contrary or restrictive that it made them mad. Scarcely an article on building in national magazines has been without criticism of "restrictive codes." California has had the added confusion of a code of safety orders, superseding other codes in commercial and industrial occupancies, which was rewritten completely from the National Electrical Code in 1934, and is just now being revised by com-

EDITORIAL VIEWS

plete rewriting of the 1947 NE Code. Small wonder that the public is aroused.

Public officials get themselves elected by promising to save the people from their troubles, one of the worst of which is housing. Is it any wonder then that politicians have turned on local codes and building departments in their endeavor to show the public some results?

Meanwhile only a rare few inspectors have reinforced their position by selling themselves and their service to the public. Some of it can be done for them by other branches of the industry but by far the most effective public relations is done by the inspector himself with his own community. Examples prove it. Also by making a strenuous effort among inspectors for uniformity of codes they can remove a great source of public disfavor.

What Makes a Good Executive

IF YOU were asked to name the ten top-ranking executives in any branch of the electrical industry, what specifications would you use? This question was posed to one of the industry's best friends and severest critics recently. He answered it by reciting a personal experience. He was in Washington with a group of attorneys when a question was raised as to just who were the ten leading utility executives in the country. The lawyers prepared a list and suggested that our friend do likewise. When compared, each of the two lists contained ten totally different names.

Analysis revealed one salient difference in the people selected. The lawyers' list was composed of executives who had performed notably. In every instance their companies had been involved in plenty of trouble. These leaders had brought them out of it in able fashion. Men on the second list, however, had totally different attributes. Without exception, they had anticipated trouble and by careful planning and able direction had avoided it.

In a complex business economy undoubtedly both types of executive leadership are necessary. However, if we were a young fellow building for the future, we would be inclined to follow the second pattern.

Family Business

MORE sons join their fathers in the electrical contracting business than is generally realized. This was noted by Don Larson, Rocky Mountain Chapter, NECA manager, in his Christmas bulletin, in which he listed the father and son combinations, those with sons-in-law, brothers and the businesses founded by the fathers of present owners. The conclusion Larson drew from it was that the electrical contracting industry should be one big happy family.

This is particularly interesting because in a questionnaire passed around at a recent meeting (told of in Electra's Husband in November) utility men were not so inclined to hope that their sons would select the electric utility as their life work. With contractors it seems to be different. Sons join probably because of the independence of contracting, its freedom, its opportunity and its excitement.

It is to be hoped that the younger generation who enter their father's business will bring to it some of the teamwork that they learned at schools which many of their dads never finished.

You Can Say That Again —

For it is a truth, which the experience of ages has attested, that a people are always most in danger when the means of injuring their rights are in the possession of those of whom they entertain the least suspicion.—*Alexander Hamilton in the Federalist No. 25, Dec. 21, 1787.*

The expenses arising from those institutions which are relative to the mere domestic police of state, to the support of its legislative, executive and judicial departments, with their different appendages, and to the encouragement of agriculture and manufactures (which will comprehend almost all the objects of state expenditure) are insignificant in comparison with those which relate to the national defense.—*Alexander Hamilton in the Federalist No. 34, Jan. 4, 1788.*

Johns-Manville Announces Two New

Smooth layers of Quinterra Type 6 Electrical Insulation **(Twin-ply)**, *used in winding a Marcus dry-type transformer*

Quinterra

TYPE 6 (TWIN-PLY)

A new cost-reducing, high-temperature insulation that prolongs transformer life many times through its resistance to pyrolysis

Here is a radically new asbestos-base, continuous-sheet, paper-like electrical insulation that offers many economies. It is primarily intended for interlayer and wrapper insulation in windings and coils used in Class A and B transformers (internal hot-spot temperatures 130C, or higher if special varnishes are employed).

Quinterra Type 6 is plied at the factory by welding two layers of Quinterra and calendering them into a dense, strong and smooth-surfaced insulation having good tensile and bursting strengths. For economical application with a minimum of waste, Quinterra Type 6 is furnished in continuous rolls cut to exact widths.

Excellent handling properties

Uniformity of physical and handling properties enables assemblers to achieve production rates such as are attained with the best types of interlayer and wrapper insulations. Further economies result from the large square-foot-per-dollar coverage.

Excellent constructional advantages

The plied construction of Quinterra Type 6 offers two distinct constructional advantages: (1) It provides better dielectric protection than a single layer. (2) Under stress, the weaving strains within coil structures are less likely to damage a plied insulation than a single-layer insulation.

Excellent dielectric-thermal characteristics

The base sheets of all Quinterra products are made 100% inorganic, but, for mechanical reasons only, are saturated with an organic resin. At room temperature (ASTM conditions) Quinterra Type 6 averages in excess of 550 VPM. After prolonged exposure at 175C, long after the thermoplastic saturant is driven off, it still maintains its original dielectric strength and requires only the re-establishment of its varnish protection to provide a further useful life cycle.

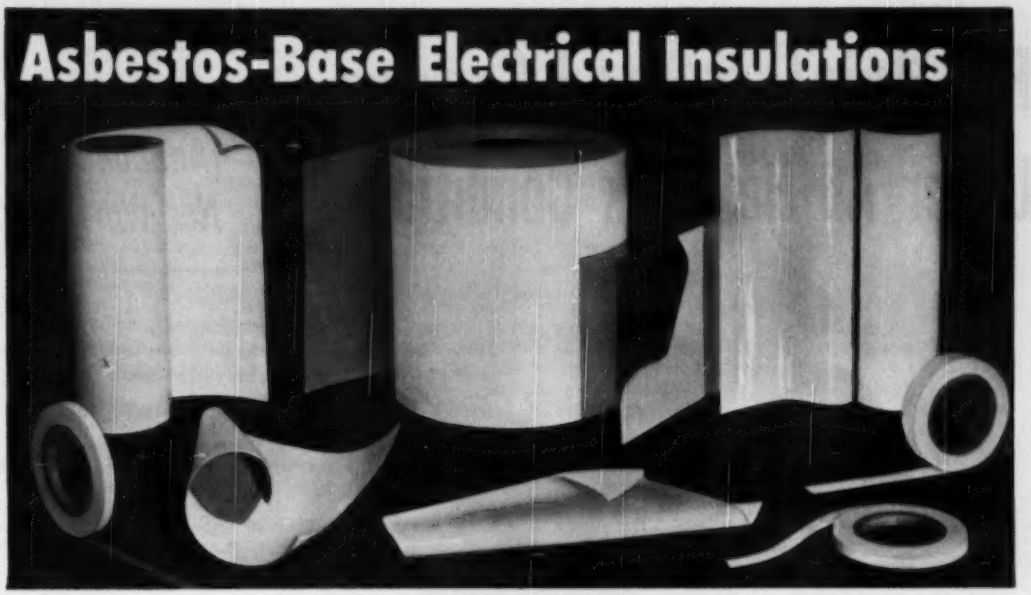
We will be glad to provide you with samples and further information about Quinterra Type 6 Electrical Insulation. Write Johns-Manville, Box 290, New York 16, N. Y.

Weights and thicknesses of Quinterra Type 6

Thickness ± 10%	Weight Per 100 sq ft ± 15%	Approx Coverage sq ft lb
.0045"	2.5	40
.006"	3.3	33
.007"	3.8	26
.008"	4.5	22
.009"	4.8	20
.010"	5.5	18
.012"	6.3	16
.015"	7.2	14

Johns-Manville

Asbestos-Base Electrical Insulations



A variety of types of electrical insulations as produced by combining glass, mica, and organic papers and films with Quinorgo #3000 or #4000.

Quinorgo

#3000 AND #4000

New, economical, high-temperature insulations with a previously unattainable combination of dielectric and mechanical properties

Quinorgo #3000 and Quinorgo #4000 are two new insulations developed by Johns-Manville. Each can be used alone or in combination with other dielectrics. In the latter use they can be either treated or coated with insulating varnishes, or combined with organic or inorganic electrical insulating sheets or films.

Quinorgo insulations contain 80% or more of specially processed asbestos fiber, the remainder being selected organic fibers and binders. The two types differ in that the organic portion of Quinorgo #4000 contains a small amount (3% or less) of resin not present in Quinorgo #3000. The resin slightly reduces absorption and penetration.

These highly improved forms of asbestos electrical insulations have extreme uniformity of texture and caliper (from .005" to .015"). They are furnished in continuous rolls, in tapes of exact widths and in sheets cut to size.

Excellent for compactness — Quinorgo #3000 and #4000 have important advantages where asbestos papers previously could not be used because they were too thick, their dielectric too low, or strength inadequate.

Excellent for "composites" — Quinorgo #4000, because of its heat resistance, closed nonwoven structure, uniform thickness and special penetration characteristics, is ideal for use in composite insulations.

For example, it may be coated on one surface with shellac or varnish to permit bonding or cementing to it such mechanically or dielectrically stronger materials as inorganic woven cloths and mica or organic cellulose films or sheets. The opposite surface remains ready for absorption of treating varnishes used in the further processing of equipment after the composite insulation has been applied.

Excellent for economies—Quinorgo #3000 and #4000 may be economically substituted for quality grade organic or inorganic layer insulation. When varnish-protected in apparatus, they will perform indefinitely because of their high asbestos content. (Hot-spot temperatures to 130C).

We will be glad to provide you with samples and further information about Quinorgo insulations. Write Johns-Manville, Box 290, New York 16, N. Y.

General average properties of Quinorgo #3000 and #4000

Thickness	Lbs Per 100 sq ft	1" wide Longitudo T.S. lbs	Dielec Min VPM
	3000-4000	3000-4000	3000-4000
.005"	1.5 1.7	14 15	300
.007"	2.2 2.5	18 19	300
.010"	3.3 4.0	20 21	250
.013"	4.7 5.7	26 28	200

Electrical Insulations

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For Uninterrupted Service Under All Network Conditions

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(Anaconda Net Work)

Time-tested since 1932 under all service conditions, subsequent improvements provide additional security in this long-famous network cable.

● Tough, easily handled, Type ANW-insulated, neoprene-jacketed cable incorporates six important advantages . . . important to you for underground duct installation:

1. Better heat and flame resistance—protected by the same neoprene jacket as Anaconda mining cables which must and do meet the severe flame test of the U. S. Bureau of Mines.

2. Higher resistance to duct acids and alkalies—years of experience with Type ANW insulation with only a braid covering showed it to be highly resistant to oils, acids and alkalies encountered in soil and sewage waters. NOW it has the additional protection of the neoprene jacket which itself has shown by test and experience, excellent resistance to these agents of destruction.

3. Higher operating temperature—now 75 C copper temperature, continuous duty.

4. Superior aging—Type ANW insulation has demonstrated year after year . . . and now even better . . . long-aging characteristics under severe oxygen bomb and air bomb tests.

5. Low moisture absorption—Type ANW insulation has always had low moisture absorption . . . far less than is detrimental to safe operation.

6. More easily handled—passes 180 degree cold-bend test at 0° C without damage to jacket. Cable is lighter, easier to pull. No lead to fuse, insulation and jacket do not support combustion.

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ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Sharp chisel

Biggest headache in electrical construction field right now is **price cutting** and **everybody's doing it,** up and down the distribution chain, blaming the other fellow, demanding that something be done about it—by the other fellow. The only thing that works is **individual** salesmanship and good service to the customer at a fair price, refusing to take bait to chisel. It is that simple.

What customers like

For instance, take **Baker-Stanton Electric** at Eureka. It takes the business right to the customers. Has two trucks fully equipped with tools, materials, appliances, even eating and sleeping facilities, which leave Monday morning and stay out all week, calling on farms, running extensions, wiring houses, barns, selling appliances, making repairs, billing and collecting.

Too easily changed

Electrical inspectors are greatly exercised over the new **snap-in types of breaker panels,** fearful that ambitious appliance salesmen will come along afterwards, slip in a larger amperage breaker to serve a heavier appliance and the hidden wire size won't take it and burn up. **Northern California Chapter** passed a resolution asking **Underwriters'** to withdraw approval until this contingency is prevented by changed design.

New types

RLM Standards Institute has adopted four new standard specifications for two- and three-lamp, 72- and 96-in. fluorescent industrial, open end porcelain enameled fixtures, according to **Leonard Hobbs, Smoot-Holman Co.,** Los Angeles, who is RLM secretary. **Rudy Staud, Benjamin,** was re-elected president. RLM also eliminated 75-watt incandescent units because of reduced lamp bulb size.

Hot

Manufacturers are having a tough go making a **ballast** for the long slim lamps that UL will approve for recessed fixtures, especially over 425 ma. They heat up, drool, and some even explode and throw glass around—not good.

Boycott

New York's IBEW No. 3 put in writing its intention not to boycott products not carrying its label. **NEMA** is all set to throw all the lawbooks at the union if it renews its boycott.

Fined

Ten electrical manufacturers of switchgear paid $40,000 in fines in making a nolo contendre plea to anti-trust charges for fixing non-competitive prices on switchgear sold to utilities.

Rewrite code

Hearings on the proposed revision of California's outdated **Safety Orders** went smoothly until **Fred Strauss** asked to enter in the record his oft repeated request to adopt the **National Electrical Code** by reference and supplement it with only such changes as deemed necessary, instead of publishing a fully rewritten code. Then those who bear the code great personal hatred tied up the hearings for hours with denunciations. Strauss has put his thoughts in writing in an open letter to **Paul Scharrenberg,** chairman of **California's Industrial Safety Board.** No decision has been made as yet.

Accurate figurin'

Need some information on **electrical estimating? Ray Ashley,** research engineer for Chicago's Electrical Contractors Assn. and author of many articles on estimating, has just published a book on **Electrical Estimating** that has about everything in it. It's published by **McGraw-Hill Book Co.** at $6.50.

Who strikes who

With coal and Chrysler strikes on, a telephone strike threatened, what's in the wind on **electrician's union demand,** come negotiations time? So far two of the bellweather localities in California have gone past their renewal dates without more than a pass at some fringe "requests" but nobody is making an issue out of them. **Paid vacation** demands will rise again in the bay area. But **customers are striking too,** on big work especially, one cause for contractor desperate bidding. More increase could kill somebody's golden goose.

New series

Frank Short, engineer, Los Angeles, has started a new series of his **bulletins** on codes, safety orders, interpretations and explanations. Reason is that there is a new edition of **Safety Orders** due soon, new Los Angeles area ordinances being revised. So the new series is colored orange, has new numbers.

Bulb snatcher

Make your own vacuum in a rubber cup and with it, at the end of a long stick, remove any kind of incandescent lamp, including reflector types—such is a useful **new bulb changer** just announced by **Lumidor Mfg. Co.**, Los Angeles.

New things

Have you heard of some of these new things: **Powder Power Tool Corp.** of Portland has a new model **Drive-it 300** with improved safety, control, extension, quiet and weight, using a flangeless drive pin. . . . **National Electric Products** has answered the inspectors question by offering a **Plug-in strip** with a grounding slot at each outlet for plugging in the new plugs. . . . **Upright Scaffolds** of Berkeley makes an adjustable, demountable pipe **scaffold** for contractors use indoors for fluorescent maintenance, installation. . . . **Commercial Plastics** of Chicago makes tough **plastic straps** to fasten cables to walls, studs, etc. They conform to cable shape. . . . **Appleton's switch boxes** that can be nailed quickly to studding. . . . **Swivelier's** new **Midget-Toplite** for use with small bulbs to punch a beam of light down.

Changes

Some prominent bay area contractor **organization changes—Scott-Buttner** of Oakland bought out **Ryals Electric Co.**, San Francisco, to make it a San Francisco base of expanded operations. . . . **Frank Boyd** and son **Bill** have bought out the **Walter Vance** interest in **Pacific Electric Motor Co.**, Oakland. . . . **John B. McDonough**, since 1926 with G-E with 5 years time out with the Navy, has joined **J. D. Power** as vice-president and treasurer of **West Coast Electric Works of S. F.** and the company will go into bigger, heavier machinery and even switchgear manufacture.

Watch

Idaho State Electrical Contractors Assn. awaits eagerly the outcome of the special session of its state legislature which has some needed amendments to the state electrical law on the hook.

Among people

Walt Coburn has returned to the San Francisco area after several years in Seattle to represent **Federal Electric Products Co**. . . . **Roy Dahlin** has been made **director of lighting** for **Southern California Edison Co.**, taking the place of the late **George Rankin**. . . . **Tom Ealing**, another lighting engineer in that office was made **manager** of the **Oxnard** office of **Edison**. . . . **Jack Rashleigh, Sylvania** representative in Los Angeles, was promoted to assistant division manager at Chicago.

$64 ?

"Who's to Blame for Contractor Inertia?", meaning in the promotion of **Adequate Wiring**, is to be a forum subject, led by a contractor from Texas, at the **National Adequate Wiring Bureau conference**, St. Louis, Feb. 16-17.

Hot lamp

Incandescent lamps are going to be advertised more, **Don Mitchell**, president of **Sylvania**, told dealers in the West. Meanwhile that company has announced a **new heat-resistant bulb** for a 300-watt weatherproof incandescent reflector lamp.

Hotter water

An **immersion commercial kitchen sink water heater** and a line of **booster** water heaters to raise water temperatures for dishwashing in restaurants to meet rigid Western state laws is being offered by **Industrial Engineering & Equipment Co.** of St. Louis.

Lamp drop

Reduction in price of from 10 to 25c in standard warm white **flourescent lamps** is announced by **General Electric Lamp Dept.**, bringing them in line with those of standard cool lamps. The new **deluxe warm and cool lamps**, seen only in samples so far, are promised in stock by March, says **Francis Faige. G-E Lighting Solution Data Sheets** are being mailed to contractors now by a regular schedule to stimulate ideas for selling good lighting installations.

Bed

A new **adjustable hospital bed lamp** that clamps to bed frame inclined to any angle is announced by **Fostoria Pressed Steel Corp.**, priced at $9.90.

Takes it

William Brand & Co. has upgraded its **Turbo plastic coated wire** by using a coating, without braid or jacket, that is approved by UL for 105° C. It will stand soldering conditions.

Make own

Moe Bridges Corp. is using two basic units—a two and a four lamp—and a standard shield that will take glass, plastic or louvers. A contractor can make up any type of fixture from these basic units in 40, 85, 96-in. and cold cathode.

Quick kit

For **service entrance cable** localities **M&W Electric Mfg. Co.** of East Palestine, Ohio, makes up standard package **kits** containing all necessary parts for an installation, including unbreakable plastic entrance cap, connectors, straps, wall flange and screws.

What are the advantages of GAS-FILLED CABLE?

What are the operating pressures of GAS-FILLED CABLE?

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GENERAL ELECTRIC

THE MONTH IN BRIEF

Voters Would Have Say on Merger

The Portland city council is on record against consolidation of Pacific Power & Light and Portland General Electric companies without a vote of the people. Action of the council followed statements that proposed purchasers of PP&L common stock from American Power & Light (see story page 115) contemplated approaching PGE with a view to merger of the two utilities. Stating that she believed that a majority of Portlanders "definitely prefer continued competition and continued operation of PP&L as a separate public utility," Mayor Dorothy Lee recalled that the city's voters had once rejected a merger proposal and had recently renewed PP&L's franchise. Regarding proposed sale to a syndicate headed by R. J. Van Ingen & Co., Mayor Lee wrote: "I feel that the proposed deal is speculative on its face, both because of the price and also because of the terms of the sale. I feel the net result would be a definite burden on the consumers and would cause pressure for higher rates which would not be justified."

PUD Proposals Will Be on Ballot

Public power forces expect to have proposals on the ballot at the next election for creation of PUDs in Walla Walla and other southeastern Washington counties now served by Pacific Power & Light Co., according to Frank A. Stewart, managing director of the Washington Public Utilities Commissioners Assn. If the proposals carry, the PUDs will attempt to buy PP&L distribution facilities in their districts.

Towns Tax PUD

When the Washington State Supreme Court ruled that pinball machines were illegal, it made a direct hit on the pocketbooks of some towns and cities that gained revenue by taxing the machines. The City of Chehalis, to make up for this tax loss, has passed an ordinance levying a 3% tax on gross income of any firm selling or furnishing electric light or power in the city. The tax, which affects only the Lewis County PUD No. 1, is estimated to raise about $8,500 a year. Winlock, Wash., previously ordered a 2% tax, estimated to raise more than $2,000 annually.

Wheeling Issues Before Regulatory Bodies

Idaho Power Co.'s petition for rehearing on an FPC order requiring the company to carry federal power on transmission lines from its Bliss hydro plant as a condition to license was denied by the commission last month, but terms were modified (see story on page 114). Last month also came dismissal by the California PUC of the government's case against Pacific Gas and Electric Co., in which wheeling issues were involved. (EWEST, November 1948, p. 106.) The state commission, however, stated that it was "not called upon to decide whether or not it has authority to compel the company to perform wheeling or exchange service for the government." The burden, the commission said, was on the government to make known the particular type of rate relief it is demanding and as the record now stands, it has not done so." A separate opinion by Commissioner Ira H. Rowell approved the dismissal but differed with the conclusions expressed by the commission in justification of the order. (Story on page 116.)

Kings River Proposal Opposed

A Congressional bill to integrate California's Kings River into the Central Valley Project has been opposed as "unconstitutional and contrary to public interest" by the Kings River Water Assn. The association, which is in accord with the FPC decision to authorize development of the river by the Pacific Gas and Electric Co. instead of the Bureau of Reclamation, represents all districts with water rights in the area. FPC recently announced it would reopen hearings on the matter in March. (EWEST, January, p. 98) Philip A. Gordon, association chairman, said that Cecil F. White, representative from the area concerned and author of the bill calling for federal development of the Kings, was in error in questioning the water users' rights "to all the normal flow of the stream." The claim that the bureau has "important 'social objectives' here in the valley will not support the bureau in taking any Kings River water by administrative action or directive," he said. "Even Congress can not deprive citizens of vested rights without due process of law and proper compensation."

Power Law Upheld

Constitutionality of the new Washington state power law was upheld, in a decision given Jan. 23 by Judge John M. Wilson of Thurston County. (EWEST, January, p. 98.) If there is no appeal, his decision clears the way for proposed purchase of Puget Power properties by seven PUDs.

Rehearing on Water Diversion Denied

Southern California Edison's petition for rehearing of the FPC order calling for water diversion from the company's Kern hydro plant for recreational facilities in the Sequoia National Forest was denied Jan. 16. The commission last November ordered the water diversion from June through September, modifying a license granted in 1946 (EWEST, December, p. 116). Petitioning the commission for rehearing, the company contended that completion by the Army Engineers of the Isabella reservoir, upstream from the electric plant, would make adequate water available for recreation without water diversion. In denying the petition, FPC declared that it had considered construction of the Isabella reservoir in its decision. The new reservoir will not enter into the picture until it is completed and placed in operation, the commission added.

Seattle Vote Forecast

A vote by the citizens of Seattle on the proposed purchase of facilities of the Puget Sound Power & Light Co. in the September or November elections was forecast last month by Acting Mayor David Levine.

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THIS MONTH'S NEWS

FPC DENIES REHEARING ON BLISS LINES

Idaho Power Co.'s controversial transmission lines from its Bliss hydroelectric plant (EWEST, December, p. 114) will not be the subject of a rehearing by the Federal Power Commission, but the commission has modified the terms under which it ordered the company to carry federal power. FPC on Jan. 18:

1. Denied Idaho Power's Nov. 10 petition for a rehearing on the commission order of Oct. 13.
2. Amended the order to provide that federal power agencies using spare capacity on the company lines must reciprocate by making available to Idaho Power any unused capacity on government lines.
3. Reduced from 30 to 24 months the period of notice required of the company to repossess lines in use by the government.
4. Clarified provisions of the license order relating to fishery resources.
5. Turned down a request of the Secretary of the Interior for further protection for Reclamation projects.
6. Dismissed formal complaint by the Secretary against the order.

Reciprocity in using lines of the government was provided the company under the same terms as the federal use of company lines. Federal use of Idaho Power lines was made contingent upon reciprocal rights to the company.

Finding that the 30-month notice was longer than necessary, FPC said that any decision about repossession of lines could be made in 15 months. An additional nine months would provide time for the government to build substitute capacity for the lines which Idaho Power completed in less than eight months.

Fish protection provisions of the original order were not clear, FPC noted, amending its order to provide for construction by the company of fish life facilities as ordered by the commission.

Standard license provisions for protection of reclamation facilities were held to be adequate without the modification requested by Interior.

Four members of the commission ruled on the latest round of the Idaho line fight, with Commissioner Mon C. Wallgren not participating.

NEW OFFER MADE FOR PACIFIC COMMON STOCK

A new offer by an eight-firm investment syndicate to purchase a half million shares of common stock of Pacific Power & Light Co. from the parent American Power & Light Co. for $15 million cash has been made. It is conditional upon denial or withdrawal of a previous offer by a group headed by B. J. Van Ingen & Co., New York.

In amending its application to the Securities and Exchange Commission to sell PP&L, American asked approval of the Van Ingen offer, emphasizing that it sought the new sale only if the earlier offer did not go through.

The new offer was made "upon the distinct understanding that this offer is not to be subject to acceptance by you until such time as there shall have been denial or withdrawal of the present application." It was made "with the bonafide intention of effecting distribution of stock."

Members of the group making the new bid and their portions of the $15 million offer: Allen & Co., New York, $4.5 million; Blyth & Co. Inc., New York, $3.7 million; Blair, Rollins & Co. Inc., New York, $2.1 million; Kidder, Peabody & Co., New York, $1.5 million; Schoellkopf, Hutton and Pomeroy Inc., Buffalo, $1.5 million; Robert Hawkins & Co. Inc., Boston, $700,000; Pacific Northwest Co., Seattle, $500,000; Buthcer and Sherred, Philadelphia, $500,000.

● BONNEVILLE Power Administration has transferred $2,000,000 in surplus power revenue for 1949 to the federal treasury general fund for the Bonneville Dam project account, Corps of Engineers. Advance payments to date will permit return of all power charges on the dam ten years earlier than the originally planned amortization period, BPA stated, in 1984 instead of 1994. Payments so far, including operating expenses and interest, total $31,208,000. Costs of constructing the project are estimated at about $87,500,000, with $59,500,000 repayable from sale of power.

● MCGRAW-HILL PUBLISHING CO. has entered into agreement with University Microfilms, Ann Arbor, Mich., to make available to libraries issues of a number of McGraw-Hill publications in microfilm form. The positive microfilm is furnished on metal reels, suitably labeled. Inquiries concerning purchase should be directed to University Microfilms, 313 N. First St., Ann Arbor, Mich.

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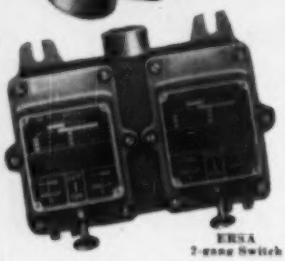

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COMMISSION DISMISSES WHEELING CASE

The federal government's suit to force Pacific Gas and Electric Co. into wheeling power to government agencies in California was dismissed Jan. 17 by the State Public Utilities Commission.

The commission did not rule on the wheeling issue, deciding that the government's case did not call upon it "to decide whether or not it has the authority to compel the company to perform wheeling or exchange service for the government."

Heard late in 1948, the suit asked that the commission establish a special class of service providing for an exchange or wheeling of power between the government and the company and fix rates for such service. The service was asked for 25 government agencies having a demand of 500 or more kw.

The government claimed that in fact it was already exchanging power with the company, delivering power at Shasta and a number of government bases and in turn accepting delivery of power from the company at its agencies. It asked that the service be "recognized" as a different class from the ordinary commercial service.

Granting PG and E's plea for dismissal, the PUC ruled that if the government were not seeking a new class of service, but only the establishment of a new rate schedule, then it should have made known "with reasonable certainty, the particular type of rate relief it is demanding."

It further declared that it had not been shown that rates now charged by PG and E are "in any respect, prejudicial, unreasonable or otherwise unlawful."

The company had protested that the wheeling service was not one it had undertaken to give as a public utility service, and that forcing it to give such service would amount to seizure of its property.

It charged the Bureau of Reclamation with attempting to move into the utility business in California in competition with PG and E, using company transmission facilities to help take away company customers. It cited "discussions" the bureau had had with a number of northern California municipalities for sale of Shasta power.

Separate Opinion

In a separate opinion, Commissioner Ira H. Rowell stated that he agreed the government's complaint should be dismissed but that there was uncertainty in his mind as to the effect of the order when read in light of the conclusions expressed by the commission in justification.

The "record is perfectly clear with respect to the rate relief sought by the government covering the service which defendant has been and is now supplying the various governmental customers," Rowell said. "Therefore, the only question for decision is whether the evidence presented by the government in support of its claim that rates should be reduced for the future and reparation be awarded for the past, is of sufficient persuasiveness to justify the commission in granting the rate relief demanded.

"I am convinced that upon that issue the record justifies an unequivocal finding that the government has not shown wherein the rates charged by defendant are in any respect unreasonable or prejudicial as applied to the government. The complaint should be dismissed upon that ground alone. Moreover, the reasons which prompt the commission to reach that conclusion should be adequately set forth."

Utility Demurrer Overruled By Judge in PUD Suit

Judge James Alger Fee of the federal district court at Portland, has overruled a demurrer filed by the California-Pacific Utilities in a suit brought against the company by the Union County PUD to condemn properties in Union and Baker counties in eastern Oregon.

In its demurrer the company denied that directors of the PUD have authority to make a valid offer for the company's properties. The PUD maintains that it has made a bona fide offer of $1,500,000.

The PUD seeks to purchase a 66,000-volt transmission line between Baker and La Grande, a 22,000-volt transmission line between North Powder and Elgin, hydroelectric plants at Cove and La Grande and other company facilities.

Judge Fee placed the PUD's suit on the court calendar.

PG and E Has Full Control Of Vallejo Electric

Pacific Gas & Electric Co. has acquired full control of the Vallejo Electric Light & Power Co. with the purchase of 55% of stock outstanding. It had owned a 45.8% interest in the Vallejo utility since 1929. VEL&P serves about 13,500 customers. No changes in personnel are planned for the company, W. G. B. Euler, PG and E vice-president and general manager, reported.

Located at the Colgate Power House of Pacific Gas and Electric Company, these eight three-phase breaker units have individual interrupting capacities of 1,000,000 kva each. More complete details of this installation are supplied by Pacific Electric Manufacturing Corporation, builder of these breakers: "Frame mounted type JE-42-E; rating, 69 kv, 600 amperes, 1,000,000 interrupting kva. Use of sliding shoe contacts requires no critical adjustments to fix closed position. Contact pressure is not affected by wear. Other PEMCO features include closing by motor-compressed springs so that equal quantity of stored energy is released at each operation, no matter how frequent; expulsion chamber arc extinguishment, and . . ."

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COPCO LICENSE APPROVED FOR DAMS ON UMPQUA

The Oregon State Hydroelectric Commission has approved a license covering construction of two power dams on the North Umpqua River by the California Oregon Power Co. The dams will be located at Slide Creek and Soda Springs. A 40-mile transmission line will connect the project with the Dixonville substation at Roseburg.

Including the $6,000,000 Toketee unit, which was placed in service last summer, Copco's North Umpqua development will represent an investment of $14,390,000. The three plants are so arranged that waters of the North Umpqua River discharged at the Toketee plant will be diverted to the Slide Creek unit and then on to the Soda Springs unit. Thus the same water will produce power at the three sites.

The company's license requires that sufficient water be by-passed at each dam to sustain fish life in the stream.

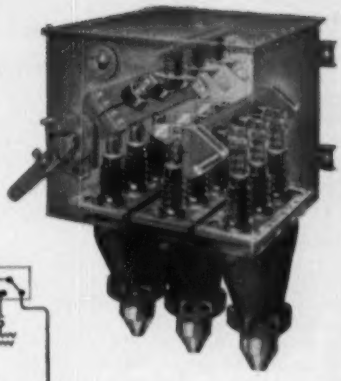
Rated capacity of the Slide Creek project will be 18,000 kw. It will consist of a reinforced concrete diversion dam located 1,000 ft. below the Toketee power plant, and a concrete-lined canal and timber flume 2 miles long leading to the power house. It is scheduled for completion in 1951.

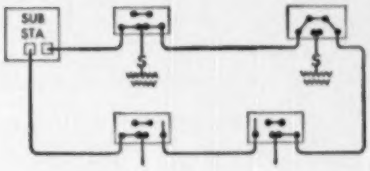
Bonneville Rate Schedules Approved by Commission

FPC has confirmed temporary rate schedules proposed by Bonneville Power Administration for sale of electric energy to Portland General Electric, Puget Sound Power & Light, Washington Water Power, Pacific Power & Light and Mountain States Power companies. Under the contracts, approved for a one-year period ending Sept. 30, 1950, BPA agrees to deliver 311,000 kw. to the companies at a load factor of not less than 60% (EWest, December, p. 114).

● The Utilities Committee of the Seattle City Council has approved the recommendation of E. R. Hoffman, City Light superintendent, that South substation be insured for more than $11,000,000, particularly against falling aircraft. Coverage of $2,983,331 is proposed to protect the plant and $8,500,000 to insure against loss of revenue. Probable premium would be about $4,000 annually. The substation is only a short distance from Boeing Field, used by large commercial and military aircraft.

KEEP EQUIPMENT OPERATING





Localize Trouble with G & W Sectionalizing Devices

G & W Type "RAL" *Load Break* Oil Switches provide safe, convenient, versatile sectionalizing of loop circuits supplying several loads. They are designed for three way operation. Maximum versatility with minimum space is provided by a tie bus and two load break oil disconnects in each switch.

In this sample installation "RAL" switches may be used to isolate any load while supplying the remaining loads from either feeder—or any feeder section may be isolated while supplying all loads from the alternate feeder—or the feeders may be balanced to provide for any peak or abnormal loading.

The "RAL" switch is one of many types of G & W Type "RA" switches using a rocker arm, floating link switching unit. These switches are made in standard units for 600, 7500, or 15,000 volts, and 400 amperes. Special units may be made for other requirements. "RA" switches are lever operated from outside the tank. They may be fitted for remote or automatic operation.

CONSTRUCTION DETAILS INSURE SAFE OPERATION

¼" Steel Plate Welded Construction—All Live Parts Fully Immersed in Oil—Completely Oil and Water Tight—Visual Inspection of Oil Level—"Resistoyl" Gaskets on all joints—Rotary Oil Seal on Operating Lever Shaft.

Send for Your Copy of Bulletin No. H49, a manual on "Primary Cable System Flexibility".

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STUDY NEEDED ON POWER OFFER, OFFICIAL SAYS

E. E. Hoffman, City Light superintendent at Seattle, Wash., has indicated that he will need at least two months to prepare recommendations on a power supply offer made to the city by the Puget Sound Power & Light Co. (EWEST, January, p. 98.)

Frank McLaughlin, Puget Power president, has offered to sell the city 83,500 kw. of power at $17.50 a kilowatt-year until March 14, 1952, when his company's franchise expires, should the city buy the company's Seattle system immediately. Should the city and company be unable to agree on a price, negotiation would be resorted to, under McLaughlin's plan.

The 83,500 kw. represent the output of the company's Snoqualmie Falls and White River generating plants, without which the city has said it would not buy the company's distribution system in the Seattle area. Power from the City Light's enlarged Skagit project will be adequate to serve the combined systems in 1952 or 1953, City Light officials have declared.

Acquisition Urged by Seattle Organization

A resolution urging early municipal acquisition of the Puget Sound Power & Light Co. facilities in the Seattle area has been filed with the Seattle City Council by the Seattle Municipal League, an organization composed largely of business, professional and industrial men.

Since the company "cannot obtain sufficient money to provide the proper maintenance of its facilities, the city has a responsibility to assure its customers that they will receive continuing and adequate service," the league declared. "Cost of effecting a piecemeal merger by the city's constructing of duplicating facilities would not be as economical as to acquire the company's entire distribution system in the competitive area at one time."

The league urged that negotiations to merge the company with Seattle Light be accelerated "in order to facilitate expansion of electrical facilities for present industries and encourage the advent of new ones."

● AN $895,000 LOAN from the Rural Electrification Administration will be used by the Graham County Cooperative Inc., for construction of a 69,000-kw. transmission line to join that of the Sulphur Springs Valley Electric co-op at the Graham-Cochise county line in southern Arizona. Also planned are a headquarters building and a transmission line for Klondyke and Aravaipa areas. The co-op now serves 1,668 customers over 313 miles of distribution line.

Valuation Figures Given On Puget Power System

On the basis of physical valuation, properties of the Puget Sound Power & Light Co. in Washington state are worth about $170,000,000, President Frank McLaughlin said last month, in making public a report by the firm of Jensen, Bowen & Farrell, consulting engineers.

A valuation of $180,000,000 was made prior to the company's sale of its Snohomish County properties to the Snohomish PUD for about $16,500,000. Effect of this sale is partly counterbalanced by the addition of about $7,000,000 in system improvements, McLaughlin said.

The valuation does not include "going concern" value, often computed at 10 to 15% of the cost of reproduction of the physical value. It is much higher, however, than the price basis discussed in negotiations for sale of the system to PUDs.

McLaughlin did not indicate what his selling price would be but offered the physical valuation as one of several methods of analysis. He also offered several other methods of computing value.

A broker urges that Puget Power hold out for a price of $31 a share in any sale, McLaughlin declared, as compared to the basis of $18 a share reported considered in the proposed sale to the PUDs. He arrives at this figure from the fact that the stocks of most large utilities are selling at 50% above the book value. Common stock of Puget Power had a book value of $22.21 a share Nov. 30, based upon the company's net assets after deducting liabilities, bonds and prior-preference stock. This figure is based upon total assets of $116,048,657 and a value of $48,365,191 divided among 2,177,879 shares.

Puget Power's common stock recently has been selling at $13 to $15 a share, although the stockholder's investment is set at $20 a share. Purchasers of the original stock paid nearly $100 for it and had $65 a share due in unpaid dividends when the old stock was split on an eight-for-one basis, to create the present common.

The average price-earnings ratio of 25 public utilities stocks in the same classification is cited as 10.9, which would make Puget stock worth more than $17, according to the analysis.

GENERATION ADDITIONS IN NW LARGEST IN HISTORY

Pacific Northwest power facilities added 628,700 kw. to electrical generation in 1949. This total, more than the output of Bonneville Dam, is the largest ever reported in the area in a year. Output was increased by:

Idaho Power Co. — 106,000 kw. from four units on the lower Salmon River and two units at Bliss.

Montana Power Co. — 56,000 kw. from its No. 2 Kerr plant.

Pacific Power & Light Co.—50,000 kw. from its new generator at Merwin Dam on Lewis River in southwest Washington.

City of Eugene, Ore.—36,400 kw. chiefly from Leaburg unit No. 2.

California Oregon Power Co.—28,300 kw. from its new North Umpqua River plant, first of a series of eight which will have a total production of 145,000 kw.

Seattle City Light—2,000 kw. by a raised waterhead in its Gorge plant and increased storage at Ross reservoir.

Grand Coulee—360,000 kw. from three new generators.

Also, the Northwest Power Pool has an interchange agreement with British Columbia Electric Co. which has added 135,000 kw. to its production with its new Bridge River plant.

The production of California Oregon and the City of Eugene does not go into the power pool.

Judge Approves Compromise Payment in Tax Case

Judge James Alger Fee, in federal court at Portland, Ore., has approved a compromise payment of $904,234 for federal tax deficiencies from the reorganized Portland Electric Power Co. The compromise authorized payments of $607,364 by the Portland General Electric Co., and $296,870 by the Portland Traction Co., subsidiaries of the old Pepco.

The payments satisfy tax claims filed by the federal government of more than $5,600,000 for the years 1942 through 1947.

Only remaining step in the Pepco reorganization proceedings, which began ten years ago, is settlement of a claim of some $60,000 by the state of Oregon for taxes due in 1948.

● THIRTY-FIVE YEARS of continuous service during business hours is the record of a 200-watt light bulb made in Holland. The bulb burned out recently in Fred Cooper's grocery store in Vernon, B.C. It was purchased by Cooper some time before the first World War.

Why Use HEAT To Interrupt Overload CURRENT?

Heat and Current Are NOT the Same . . .

Heat Builds Up In

COMPACT PANEL BOXES

WARM ROOMS

DIRECT SUNLIGHT

Murray FULLY MAGNETIC Circuit Breakers

are NOT Affected by Heat . . .

Because they have

NO Thermal Element!

By using the *magnetic field*, which surrounds every current carrying conductor, Murray engineers have perfected a circuit breaker that assures dependable protection combined with freedom from temperature influences. Inverse time delay is effected by a simple, hermetically sealed, factory calibrated hydraulic piston.

No "Derating!"

Why be satisfied with breakers having erratically operating thermal elements . . . with breakers that often cannot even carry rated loads continuously . . . with breakers that must be "derated" in an attempt to prevent false tripping? Insist on Murray *Fully Magnetic* Circuit Breakers — the breaker that is independent of temperature because it has ***No Thermal Element!***

Listed by Underwriters' Laboratories, Inc.

Murray *Fully Magnetic* Breakers are available in 2, 4, or 8 breaker load centers. Each breaker can be individually replaced with breaker of same, lower or higher rating.

Single pole breakers in 10, 15, 20, 25, 30, 35 and 50 amp. ratings. Only two handle positions — Off and On.

Get the full facts on Murray *Fully Magnetic* Circuit Breakers. Operating characteristics and construction features are given in this informative folder. Write for your copy now.

FOR TOMORROW'S LOADS . . .

Equip Today!

FULLY MAGNETIC

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SERVICE ENTRANCE & METER EQUIPMENT • MAGNETIC CIRCUIT BREAKERS
SWITCHES • CURRENT LIMITING REACTORS • CROWS NEST AERIAL LADDERS

Fred Reports

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Reception of the Williams Digger has been very good here in the Pacific area. We've made a lot of friends and shown them what a rugged machine will do. The ability of the digger to sink a nine foot hole in a minute really stops them. p.s. Put the coupon in our ad here so some of the folks I demonstrated can write for ordering, and price information.

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THE MAGNO-TRONIC FLUORESCENT STARTER

PROTECTS Fully automatic thermal relay with unusually long life that eliminates blinking lights and protects all auxiliary equipment.

SIMPLIFIES Replacement of worn-out lamp automatically restores closed circuit—replacement of starter unnecessary. No button to push.

REDUCES COSTS Magno-Tronic starters provide exact timing in the lamp electrode—preheating process preventing excessive loss of emission material thereby assuring the maximum in the useful life of a lamp. The established quality of this starter saves considerable time in maintenance and man hours required to repair and/or replace an inoperative lighting unit.

VERSATILE Will operate efficiently over an extended voltage under widely varying temperatures.

GUARANTEED FOR ONE YEAR

The (SP-15-20) for use with either 15 or 20 watt lamps
The (SP-30-40) for use with either 30 or 40 watt lamps
The (SP-100) for use with 100 watt lamps

Ask for descriptive literature

INDUSTRIAL ELECTRONICS CORP.

MAIN PLANT Newark 2, N. J.

CALL BIDS ON GENERATORS FOR CHIEF JOSEPH PLANT

Bids for the first four generators for the Chief Joseph Dam power house on the Columbia River in eastern Washington have been called by Col. E. C. Itschner, Seattle District Engineer, Corps of Engineers, for opening March 17 at Seattle.

The generators, first of an eventual 27, will be of 67,368 kva. each. Installation of the first generator, in readiness for final tests, is required by Nov. 1, 1954, with the fourth to be installed a year later.

General Construction Co. of Seattle has submitted a low bid of $2,265,325 on a contract for excavation to the intake channel. The figure is more than 16% under government estimates.

Initial construction of the power house will provide substructure for 20 main units and the assembly bay plus superstructure for ten of the units.

● Bids for four 73,684-kva. generators for installation in the McNary Dam power house on the Columbia River near Umatilla, Ore., have been called by the Corps of Engineers for opening Feb. 23 at Walla Walla, Wash. The contract calls for delivery of the first generator by July 1, 1954, the fourth by July 15 of the following year. The first generator is to be ready for commercial operation Dec. 1, 1954, the fourth, one year later.

● Snohomish County PUD is receiving bids at Everett until Feb. 20 for three 1,667-kva. transformers and one 500-kva. step voltage regulator. The transformers are to be single-phase, 52,500 to 2,400/7,200-volt and the regulator, three phase, 4,160 volts.

● Cowlitz County PUD was to open bids Feb. 6 at Longview for one outdoor-type, 3-pole, 60-cycle, 69-kv., 600-amp., 1,000,000-kva. interrupting capacity oil circuit breaker for 8-cycle operation. Cost is estimated at $10,000.

● The Public Utility Board of Ketchikan, Alaska, has recommended that the city council apply for funds to expand the city's Beaver Falls hydroelectric project at an estimated cost of $650,000, as suggested by John Wier, manager of utilities for the city. The proposed work would be carried out in 1953. Other funds would be sought for seven small line replacements, each estimated to cost less than $25,000, and for general system improvements and extensions, costing $103,600.

General's *New* Front-Operated Toggle Plug Fuse Safety Switch

now available . . . with or without dead front plate

FEATURES

- *Snap-action; toggle actuated*
- *Dependable, full-floating contacts*
- *All parts visible and easily accessible*
- *Laminated arc shields—easily removable*
- *Solderless pressure wire connectors on line side*
- *Can be locked or sealed with padlock in either ON or OFF position*
- *Ample wiring room and abundant knockouts*

Available for immediate delivery
(Described in detail in current Catalog 4809, page 12)

Catalog Number	Poles or Wires	Blades or Contacts	Plug Fuses	Neutral
*632NP	2	1	1	Solid
*632P	2	2	2	None
*633NP	3	2	2	Solid

**All available with dead front shields—add suffix X (viz 632NPX)*

The Switch is to General *because* General *makes a better switch*

Years of engineering research and careful testing have resulted in outstanding product improvements throughout our entire line. For example, the new Toggle Switch line contains many distinctive features which will be apparent to you immediately upon examination.

Other new and improved products now in production are the triple pullout—new raintight equipment—improved main and range combinations—and 100 Amp. fusible service equipment . . . all items finished in machine gray baked enamel and sold everywhere exclusively through wholesalers.

Write for our latest catalog, No. 4809—and supplement No. 4911.

General Switch Corp.

49 Roebling Street Brooklyn 11, N. Y.

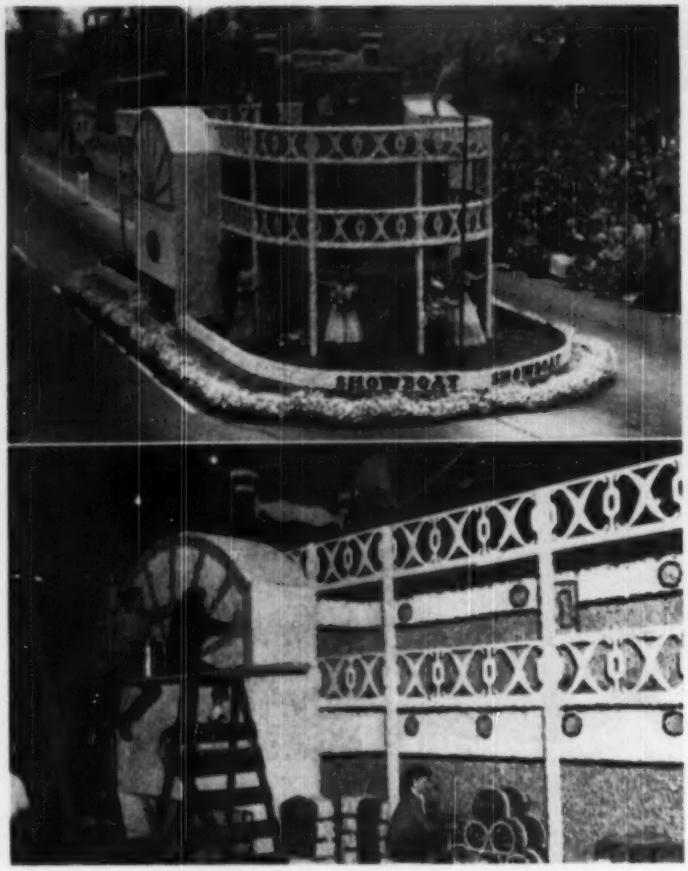
One of the largest Manufacturers of:

SERVICE EQUIPMENT . . .
Pullout, Front Operated Toggle and Side Operated types. Indoor—surface or flush, and Outdoor.

SAFETY SWITCHES . . .
30 through 1200 Amp., 250 V and 600 V Type A, C and D. Indoor and outdoor. HP rated.

ELECTRICAL DISTRIBUTION EQUIPMENT

SALES OFFICES IN EVERY MAJOR CITY



This Southern California Edison Co. Showboat won the Grand Prize in Pasadena's 1950 Tournament of Roses parade. More than 1,200,000 blossoms, picked for color and design, were placed by round-the-clock workers (below) in 48 hours

Employees Stop Work as Protest at Everett

When commissioners of the Snohomish County PUD, Everett, Wash., refused a demand of 160 employees for a 10% wage increase last month, the employees stopped work to attend day-long meetings. They agreed to maintain service for health, sanitation and public safety, only. According to Lloyd Smith, business agent of Local 77, IBEW, non-union supervisory employees had been granted a raise similar to the one asked by the union. J. N. Erlandsen, PUD chairman, said the district had granted electrical workers "fringe issues" estimated to cost 15c an hour since it took over the system from Puget Sound Power & Light Co. four months ago. Supervisory personnel were maintaining operations during absence of the regular workers, although families were without electricity in some areas.

New Street Lighting Rates Announced at Sacramento

New street lighting and traffic signal rate schedules in the Sacramento, Calif., MUD will cut nearly 7% from power bills of municipalities, public agencies, and lighting districts within the district for a total of some $7,700. The city of Sacramento, the district's largest street lighting customer, will save about $5,500 annually. James E. McCaffrey, general manager and chief engineer of the SMUD, explained that under the new system, signal installations will be served on a flat monthly charge.

POWER COMPANY ENTRY IS GRAND PRIZE WINNER

A gigantic floral Showboat, bearing the Southern California Edison Co. emblem on the sides, won the coveted grand prize in the 61st annual Tournament of Roses parade in Pasadena Jan. 2.

The float, which supported the Tournament's theme, "Our American Heritage," is said to be one of the largest to be entered in any Rose parade. Larger than the average six-room house, the float was 50 ft. long, 20 ft. wide and 17 ft. high; weighed 12½ tons.

Fifteen costumed children strolled the decks, as the massive side wheel paddles revolved, stirring up white foam. Black smoke poured from the twin stacks and white from the engine exhaust. Showboat music came from a calliope and deck hands played mouth organs.

Inside the float 34 loud speakers of the theater type were mounted on each side to broadcast the music. Two technicians with duplicate sets of recorders handled the volume and tone of both music and whistle.

A smoke-making machine provided smoke for the stacks and another machine made synthetic steam for the exhausts. An electric generating plant operated by a gasoline engine ran the sound equipment and motors to turn the paddle wheels. There was an engineer for the main power plant which drove the float, and the driver was located 30 ft. forward.

During the final 48 hours before the parade, more than 50 people worked around the clock to place the more than 1,200,000 blossoms on the float. Some of the flowers had been kept for several weeks in a refrigerated warehouse.

Engineers designed the chassis to carry the weight and maintain the correct balance. The entire structure was carried on two massive I-beams running the length of the float. Cross beams of steel and wood were welded and bolted together to form the decks and side walls of the boat.

● ELECTRICAL workers employed by more than 90 electrical firms and contractors at Seattle, Wash., left their jobs briefly Jan. 16 in protest over what they described as laxity of some employers in the matching payments they make toward employees' pensions. The major contractors, electrical sign companies and oil burner firms involved made arrangements shortly after the meeting to pay up their arrearages to the fund, according to E. M. Scheib, business manager of Local 46, IBEW.

Rugged "Staying Power"

IN ALL KINDS OF WEATHER

The real test of an overhead line comes when winter blasts your conductors with sleet, ice and high winds. And that's when you can rely on Copperweld-Copper Conductors for dependable service!

The copper-protected alloy steel core of Copperweld* wire provides high tensile strength to withstand the heaviest ice loads. The solid copper wires stranded with it assure highest conductivity. And the triangular shape of this 3-strand conductor minimizes vibration because of the irregular surface exposed to winds.

Certainly, you'll find it pays to standardize on Copperweld-Copper Conductors. They possess the added strength and safety required for long span construction. They provide extra "staying power" and longer life—at lowest overall cost.

*Trade Mark

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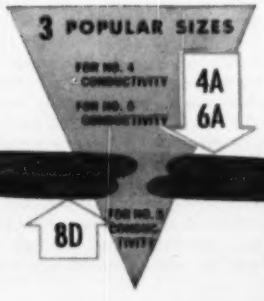

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DEPENDABLE CONDUCTORS

Cost Less because they Last Longer

R&S LIGHTING FIXTURES

VAPORTIGHT... EXPLOSION-PROOF... DUST-TIGHT...

For safe and correct lighting in hazardous areas, count on R & S Lighting Fixtures to stand up better . . . to deliver long-term, top performance . . . because of illumination engineering ingenuity and over forty years' manufacturing know-how.

Scientific design with high reflection factor provides maximum, safe, controlled lighting . . . maintenance-free. Standardized base common to all sizes. Interchangeable reflector globe assemblies of various capacities. Simplified mounting without disturbing electrical connections; with a variety of conduit arrangements in one standard base. Underwriters' laboratories approved.

Write for new catalog H-47-10.

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When you are installing or re-arranging—and need a special transformer to exactly match your requirements call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

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Versatile Hanger Iron

Safely supports hanging pipes, conduits and cables up to 500 lbs. Made of ¾-in. 18 gauge electro-galvanized steel (also available in Everdur, copper, brass or aluminum). Precision made — perforations do not vary. ¼-in. holes on ½-in. centers. Comes in 10-ft. coils and 5 and 10-ft. straight lengths. Available in other lengths also.

Send for literature and prices

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MINERALLAC

JANUARY BLIZZARDS KEEP POWER CREWS BUSY

Mid-January blizzards knocked out a score of power lines from northern California to British Columbia, stopping or curtailing service for periods ranging from a few minutes to a week.

Pacific Gas and Electric lines serving Eureka, Calif., in Humboldt County, were out for several days, forcing a shutdown of sawmilling operations. One 60-kva. line was still down at the end of a week. Domestic needs were supplied by local steam units.

A PG and E line crew restoring Humboldt County service was trapped, out of food, by blizzards in the Trinity mountains. Reached by a snowcat and plane with food supplies, the six men stayed on the job.

An ice storm that climaxed two weeks of freezing weather darkened a widespread area in northwestern Oregon and southern Washington the night of Jan. 19.

Areas served by Portland General Electric Co. and the Clark County PUD were hardest hit, with the latter suffering a complete breakdown.

To complicate the situation, telephone communications from a number of towns were cut off, delaying reports on the location of outages.

Ridgefield, Battle Ground, Camas, La Center, Amboy and Yacolt, all served by the PUD, were without electricity through the night and most of the following day.

High-tension PGE lines between Portland and St. Helens, Ore., were out, interrupting service west of Portland. City lines in high areas of Portland also were down.

PGE lines between Portland and Forest Grove also went out, leaving Forest Grove and McMinnville without power for several hours.

Pacific Power & Light Co., Puget Sound Power & Light and Seattle City Light escaped with small damage.

British Columbia's upper Fraser Valley power lines snapped under an inch or more of ice brought by freezing rain, leaving some five towns and villages and surrounding rural areas without power. All telephone and telegraph lines to eastern Canada were cut off.

In Victoria on Vancouver Island, an ice-coated line broke, cutting off mid-town power for nearly two hours.

Extended cold weather brought record demands on the Northwest Power Pool. Between 5 and 6 p.m. Jan. 17, the instantaneous peak reached an all-time high of 3,618,000 kw. Bonneville's maximum output of 2,077,000 kw. was maintained through Jan. 17 and 18, when demand was highest.

Bonneville was forced to cut off 70,000 kw. of interruptible power supplied aluminum plants during peak hours of those two days.

The only other power curtailment occurred in interior British Columbia, where sub-zero weather caused a threat of power failure in north Okanagan because of the icing water intake at B.C. Power Commission's Shuswap Falls plant. All towns in the area dimmed out voluntarily every night. Power Commission officials asked a 50% cut in power use.

Electrical Engineering Students Are Recruited

Electrical engineering students and recent graduates are being recruited for a rotational training course at General Electric's Hanford Works at Richland, Wash. The training program, expected to start some time in February, will be the first to be set up by an atomic industrial plant.

The course will give a "substantial number" of engineers from 9 to 18 months training in many parts of the plutonium manufacturing plant at Hanford. "Compartmental" security enforced in the early stages of manufacture at the plant prevented most engineers from becoming acquainted with any operation outside his particular unit.

Technical work offered in the training course can be applied for graduate or undergraduate credit at four Western schools, the universities of Oregon, Idaho and Washington and Washington State.

Dr. Winton I. Patnode, assistant to the general manager of the nucleonics department of the G-E operation at Hanford, is currently recruiting from colleges west of the Mississippi.

● CONSTRUCTION of what is said to be the world's most powerful radio station near Arlington, Wash., in Snohomish County, was scheduled to be started early in February, according to information coming from Navy officials. A contract for the construction of the main transmitter building has been awarded to Construction Engineers & Contractors, a Tacoma firm. Captain A. C. Eberhard, 13th Naval District public works officer, announced. Cost of the station is estimated at $10,000,000. Construction of the reinforced concrete transmitter building will require from 15 to 18 months. The station will be built on Jim Creek with antenna towers on Blue Mountain and Wheeler Mountain which are from 6,000 to 8,000 ft. apart. The transmitter, it was stated, will develop 1,000,000 watts of power.

RIGHT *for the* JOB... RIGHT ON THE JOB!

PINCO'S NEW L4038 Clamp

(Accommodates .16" to .375" Conductors Inclusive)

Improved Keeper Design Increases Clamping Area . . . Minimizes Possibility of Damage to Conductor.

For the past ten years, men who "know" clamps have maintained that the PINCO L 4038 was "tops" in its class. And they were right, because here was the *first* dead-end clamp that had no loose parts in conductor assembly . . . replacing a design that had eight! It also showed improved vibration characteristics with small copperweld or stranded copper conductors. Now this clamp has been made even more efficient because an *extra long* J-Bolt Keeper *doubles* the gripping area on the conductor (contacts *all* wires in the long-lay conductors) . . . holds them securely yet without damage to conductor wires.

So here again is another typical example of Pinco planning which pays off in improved product performance . . . making the Pinco phrase—"RIGHT *for* the Job—RIGHT *on* the Job" one to remember whenever you specify and buy insulators and line hardware.

The Porcelain Insulator Corporation

769 Main Street, Lima, N. Y.

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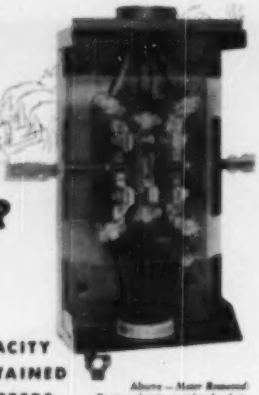
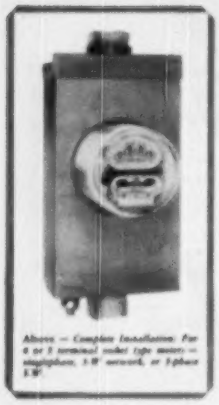
Capacity!

OVER 60 HORSE POWER TO CARRY THE LOAD





Above — Complete Installation. For 4 or 5 terminal socket type meters — singlephase, 3-W network, or 3-phase 4-W.

200 AMPERES OF SERVICE CAPACITY WITH SELF-CONTAINED SOCKET TYPE METERS

Above — Meter Removed. By-pass clamps complete load circuit during testing or removal of meter.

Duncan Type H.D.
Heavy Duty Meter Mounting Device

THE TYPE H.D. Heavy Duty Meter Mounting Device provides a compact method of connecting conductors up to #0000 copper, or 250,000 CM aluminum, directly to the terminal blades of a socket-type meter with ease and safety. The H.D. Device requires a minimum of space for metering equipment in its current range. Overall height is 18"; width, 9". The H.D. Device is particularly applicable on services above 100 amperes and up to 200 ampere capacity. For complete information send for Bulletin No. 164. DUNCAN ELECTRIC MFG. CO., Lafayette, Indiana.

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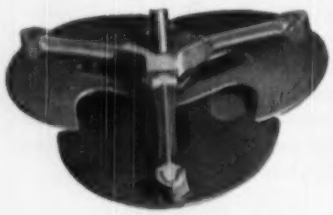
LAFAYETTE INDIANA

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life



EVERSTICK ANCHORS

For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

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FAIRFIELD, IOWA

Get MULTIFLEX BRUSHES for

- IMPROVED COMMUTATION
- MORE UNIFORM WEAR
- LOWER OPERATING COSTS

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Yes, Helwig-Speer Multiflex Brushes give you the "big three" of motor and generator performance. The best in design and materials means: (1) uninterrupted contact, (2) reduced vibration, (3) reduced circulation current, even wear. What's more, you get double-brush advantages with single-brush simplicity. Multiflex fits conventional single-brush holders. For complete information on ordering brushes, write for Catalog 95.

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NEWS ABOUT PEOPLE

● E. J. WRIGHT, San Diego Gas & Electric Co. and vice-chairman of the PCEA Administrative Services Section, recently received the Fellow Award from the National Institute of Credit. This award is made to those who have met the educational and experience requirements demanded of those who have chosen credit management as a life career and who deserve the professional confidence which the public places in credit executives. The National Institute of Credit is an organization sponsored by the National Association of Credit Men, with headquarters in New York and chapters in principle cities of the United States.

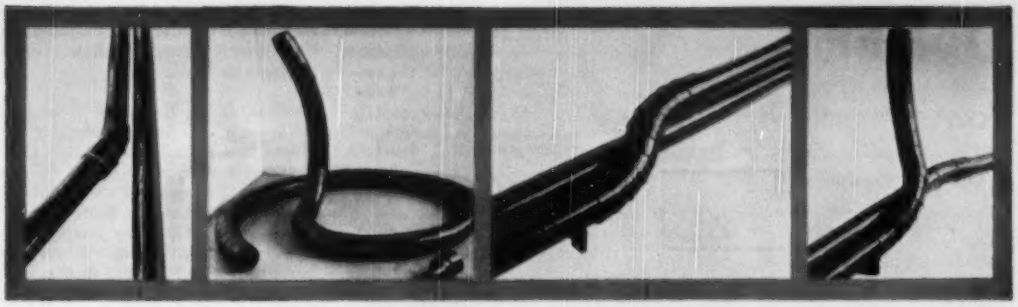
● W. E. JOHNSON has been promoted from assistant manager to manager of the Hanford Works design and construction division of General Electric's nucleonics department at Richland, Wash., succeeding F. R. Creedon, whose 26 months' contract with the company has expired. Johnson joined G-E in 1930. He was manager of engineering in the air conditioning department at Bloomfield, N. J., before going to Hanford Works in 1948 as division engineer of the reactor section of the design division.

● W. H. MOTT, Butte, Mont., has assumed the position of manager of General Electric Co.'s Butte office. He replaces C. A. CHAMP, who retired as manager after 38 years. L. M. STAUFFER has been named manager of G-E's apparatus office in Salt Lake City, following the retirement of B. C. J. Wheatlake.

● WILLIAM R. PUTNAM, one-time executive head of the Idaho Power Co., and a former president of the Northwest Electric Light & Power Assn., has joined Kidder, Peabody & Co., New York investment securities firm, as public utility consultant.

● T. L. MAYES, former works engineer at Oakland for General Electric, is the newly appointed staff assistant to B. A. Case, manager of engineering small apparatus divisions of G-E at Schenectady.

● KEN HAMPTON, manager of Valley Electrical Supply Co., Fresno, has been elected a member of the board of governors of Fresno State College Foundation.



NEW *MULTI* USE
Orangeburg Bend Sections

FOR ORANGEBURG *Standard* CONDUIT (Type I)

Short lengths of straight ORANGEBURG Conduit with offset male and female joints tooled at an angle of 2½ degrees, resulting in a Bend Section of 5°.

Available for ORANGEBURG Conduit diameters of 2" through 5" inclusive.

By joining sections together (or used individually) various degrees and length bends, offsets and spirals can be assembled in the field or at the job.

Flexibility offers unlimited use possibilities.

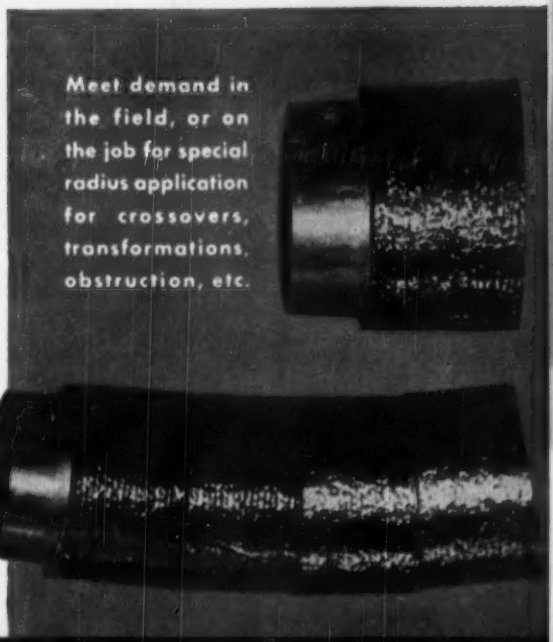
Tooled to Standard Taper Sleeve joint specifications.

Water tight joints.

Reduces inventory of Special Bends.

Low cost in relation to Special Bends.

Complete stocks of ORANGEBURG Standard Conduit (Type I), ORANGEBURG Nocrete Conduit (Type II), and fittings are available for prompt shipment from central warehouses of the GENERAL ELECTRIC SUPPLY CORPORATION.



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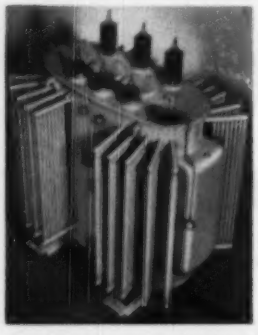
STANDARD PARTS POWER TRANSFORMERS

Custom built transformers at Quantity Production Prices

Streamlined methods of manufacturing, plus standard designs and standard parts, shorten engineering and production time to reduce prices and speed deliveries.



Single and three phase sizes up to 10,000 KVA, 69 Kv.

Transformers can be supplied with any method of oil preservation.

WRITE for Catalog No. 1492.

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GEO E. HONN CO.
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WHITER THAN WHITE
ABOLITE *Lighting*
- Industrial
- Commercial — Floodlighting
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The JONES METAL PRODUCTS CO.
WEST LAFAYETTE, OHIO
Sold Exclusively through Electrical Wholesalers

MOTORS, GENERATORS, TRANSFORMERS
1 — 1500 H.P.
Bought and Sold
New and Rebuilt
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N. Y.

● GRAYSON E. MORAN, superintendent of substations for Southern California Edison Co., retired recently after more than 35 years of service with the company. He is succeeded by H. L. "RUDY" RUDOLPH, formerly assistant superintendent of substations. A. A. STRAUB, senior engineer, substations, has been named assistant superintendent.

● HARRY S. ROSS and ARTHUR F. BLIGHT both retired recently from the right-of-way department of Southern California Edison Co. Ross had been with the company for 38 years and Blight for 37 years.

● THREE PROMOTIONS with the purchasing division of Los Angeles Department of Water & Power were announced recently. M. MILLOT is the new department purchasing agent, succeeding WILLIAM R. FOSTER, retired. HERMAN J. KASHARE became assistant purchasing agent, and RALPH F. DEBELL principal clerk in charge of the contract section.

● GERHARDT M. BABCOCK recently became superintendent of electrical station maintenance for Los Angeles Department of Water & Power, filling the vacancy created by the retirement of AARON B. JONES.

● CLIFF GALLUP, assistant superintendent of transportation for California Electric Power Co., has been advanced to superintendent of the company's transportation department, succeeding C. H. RHUDY, who retired recently.

● ED LEAHEY, engineer in charge of the Los Angeles Department of Water & Power's water system electrical division and a builder of the Los Angeles aqueduct, has retired after 40 years of service. He intends to go into the real estate business.

● E. H. VICARY, retired manager of Crown Zellerbach Corp.'s central engineering division in Seattle, has been retained by the company on a consulting basis in matters pertaining to steam and hydroelectric power generation. He will also be available to other companies.

● BURTON HALL, at one time manager of Pacific Power & Light Co.'s office at Grandview, Wash., has been appointed manager of the Benton County REA at Prosser, Utah.

● R. W. KIMBERLIN, former St. Louis district manager for Graybar Electric Co., has moved to San Francisco as district manager for the company.

● BERT PENGELLY is now advertising and merchandise manager of General Electric Supply Corp. of Portland. He was formerly major appliance buyer for Lipman Wolfe & Co.

● CHARLES W. HUSE has taken over as director of public relations for United States Steel Corp. subsidiaries, Western district, with offices in San Francisco. His assistant will be HARRY J. WILLIAMS. FRANK A. BURNS has become director of public relations for U. S. Steel subsidiaries in the Los Angeles area, with offices in that city.

● WILLIAM J. PRICE is the newly appointed industrial relations supervisor and quality engineer at General Electric's lamp works in Oakland, replacing RICHARD C. EHRMAN, who has been appointed a member of the staff of the manager of industrial relations at the company's lamp department in Cleveland.

● S. E. JARVIS has been named representative for the Electrical Service League of British Columbia in the southern section of Vancouver Island, and will maintain headquarters in Victoria.

● T. KEVIN MALLEN has been named general manager of Ampex Electric Corp. of San Carlos.

Deaths

● WILLIAM G. STEARNS, cable specialist for the Okonite Co., died Jan. 3 in San Francisco. He started with the old Standard Underground Co. in 1910 and at one time was Portland manager of that company. In 1932 he joined Okonite, and since that time had been in the company's San Francisco office.

● JOSEPH M. MCARTHUR, 72, authority on municipal power and water ownership, died Jan. 6 at Portland. He entered the utilites field at Eugene and in 1923 became chief engineer and later superintendent of the Eugene water and electric system, serving until his retirement in 1946.

● F. O. DOLSON, for many years prior to his retirement, vice-president and general manager of California Electric Power Co., and a past president of the PCEA, died Jan. 14 at Riverside, Calif.

● CHARLES H. PETERSON, 67, president of Peterson Electrical Construction Co. Ltd., died in Vancouver, B. C., recently. Mr. Peterson founded the company in 1920 and was active in it until immediately prior to his death.

ROCKBESTOS A.V.C.® CARRIES 32% GREATER LOAD

YET BOTH ARE THE SAME SIZE

Compare A.V.C. with Type RH in a 250 MCM size*

Size for size A.V.C. has a HIGHER AMPERE RATING

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YOUR BEST BUY

- you use 2½" conduit for both
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- BUT Type RH carries only 224 amperes whereas higher-rated A.V.C. carries 296 amperes—a 32% increase in capacity.

For more efficient current-carrying capacity, always specify Rockbestos A.V.C. Write for the booklet "Cut Current Carrying Costs."

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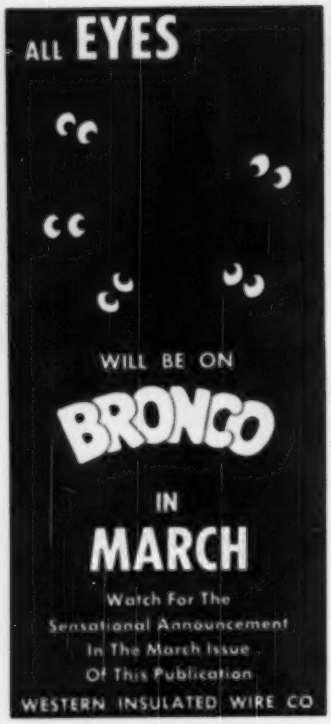


ALL the strength and durability inherent in steel are combined—with definite economies—in Crapo Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of Crapo Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE INDIANA

● FRED C. TODT, retired, former Los Angeles district manager, General Electric Supply Corp., died Jan. 21 as a result of injuries suffered when his car was struck by one driven by a drunken driver, near Santa Maria, Jan. 19. His wife was seriously injured. Mr. Todt, born in San Francisco 66 years ago, started as a student telegrapher for Southern Pacific, studied a correspondence course in lighting, began as a stockroom boy for Western Electric Co. in San Francisco in February 1906. He was shifted to sales in 1909, covered northern California and Nevada. In 1911 he joined the predecessor of G-E Supply, the Pacific States Electric Co., and worked in Portland as salesman until 1921, returned to San Francisco where he was next year made district sales manager, later district manager. In 1935 he was made Los Angeles district manager, a post he held until retirement last year. He had been active in industry association affairs, PCEA, NEWA, Los Angeles Electric Club. He served two terms as chairman of the Pacific Division, NEWA. Upon retirement he had moved his residence to Alameda.

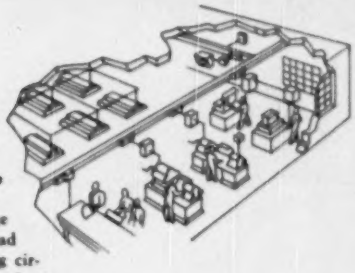
● T. E. HOLSEY, 64, manager of the Big Bend division of Washington Water Power Co., died of a heart attack recently. Mr. Holsey had been with the company for 37 years, first working in commercial sales. In 1920 he became an industrial engineer and was named division agent for what was then the Okanogan territory, now a part of the Washington Water Power system. From 1931 until his assignment as Big Bend division manager, he was assistant in Spokane to the general agent in charge of all outside divisions.

● JAMES W. FERGUSON, 70, superintendent of inside construction for Seattle City Light until his retirement two years ago, died recently at Seattle. He joined City Light in 1904 as a foreman of a crew putting equipment in the Yesler substation. He was a member of AIEE and the Electric Club.

● TED R. PAPE, manager of the commercial refrigeration department of Sunset Electric Co., Spokane, died of a heart attack recently while on a business trip in Lewiston, Idaho. Funeral services were held at Seattle. Mr. Pape had been affiliated with Sunset Electric at Seattle for 16 years before moving to Spokane a year ago.

● THOMAS H. SAWYER, 68, retired employee of Puget Sound Power & Light Co., died recently. He was associated with the utility from 1914 to 1947, serving from 1942 on as a merchandise utilization consultant.

How KUHLMAN puts power where you need it



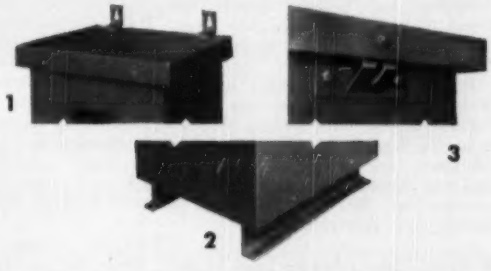
Kuhlman Dry Type Transformers deliver high voltage right to your load centers. Lighting circuits, machine tools, and other electrical equipment are most efficiently served by locating transformers near at hand. This eliminates costly long runs of heavy copper, reduces operation losses and improves voltage regulation.

Kuhlman Dry Types are air-cooled, require no fireproof vaults, and reduce fire and explosion hazard to a minimum. Available in either wall or floor mounted units, 1 through 300 KVA, single phase and 3 through 1500 KVA, three phase.

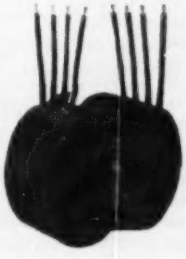
Easy installation, easy handling! Kuhlman Dry Type Transformers are equipped with convenient wall mounting brackets for bolting to wall or beam.

Floor mounted types come equipped with drilled channels for easy bolting to floor or platform surface.

Easy handling is assured by handy lifting lugs that make moving of Kuhlman Dry Types a simple matter.



Less weight, better performance are assured with the Kuhlman Bent Iron Core. Used in single phase units 25 KVA and below, the Bent Iron Core is made of high grade oriented cold rolled steel. This steel provides greater flux carrying capacity, resulting in a lighter core, lower exciting current and impedance, better regulation and performance. This all means a smaller, lighter, more efficient transformer for you.



A few turns of a wrench removes the louver panel or cover for quick accessibility to roomy terminal compartment. Handy conduit knockouts make the connection job an easy one. Result — few installation and maintenance worries when you buy Kuhlman dry types.

Get further information on Kuhlman Dry Type Transformers. Write for Bulletin CS 701 just off the press. Kuhlman also manufactures a complete line of Power, Distribution, Street Lighting, and Specialty Transformers. Bulletins available upon request.

EXPERIENCE COUNTS — THIS IS OUR 56TH YEAR

Kuhlman

KUHLMAN ELECTRIC COMPANY
BAY CITY, MICHIGAN

Export Representatives: *International Standard Electric Corporation*, 67 Broad St., New York City, N.Y. Cable Address: Microphone, N.Y.

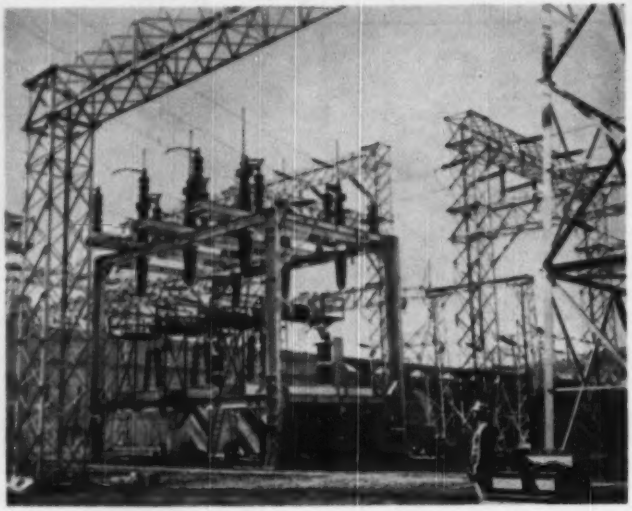
NOTES ON THE TRADE

New Lamp Sales Divisions For Pacific Coast

Westinghouse has set up three new Western lamp sales divisions, according to Walter H. Thompson, Pacific Coast district manager of the lamp division. Under the revised set-up, the South Pacific sales division, with headquarters in Los Angeles, has a territory including southern California, all of Arizona, except three southeastern counties and Las Vegas. Its manager will be Richard B. Borland, manager of the lamp division's Los Angeles branch office since 1944.

The newly created Central Pacific sales division is headed by George E. Congdon of San Francisco. His territory embraces central and northern California, southern Idaho, western Wyoming and Nevada, except Las Vegas. Congdon has been San Francisco branch manager since April 1949.

Frank T. Anderson takes over in Seattle as manager of the new North Pacific sales division, with a territory including Washington, Oregon, northern Idaho, central and western Montana and Alaska. He has been branch manager of the lamp division at Seattle since February 1943.



Ten million-kva. short-circuit capacity will become available for the first time on a regular power system when 13 General Electric Co. 230-kv. impulse-type oil circuit breakers of that rating are installed at the Grand Coulee Dam power plant on the Columbia River. Two of the units are installed and have been in operation for several months. The 18 generators in the two Grand Coulee power houses, together with other generators on the Northwest Power Pool, will have a short-circuit capacity of ten million kva. This tremendous advance in switchgear design is the result of extensive research and tests made two years ago on an experimental breaker at Grand Coulee in cooperation with the Reclamation Bureau and BPA

● E. A. Trask, former head of the San Francisco office of John A. Roebling's Sons Co. of California, has assumed new duties as manager of sales of the company's Chicago corporation. G. C. Bukowsky, former manager of the Portland branch, succeeds Trask.

● James A. Setchell of San Diego has become district representative for Allen-Bradley Co., Milwaukee. His territory comprises San Diego and Imperial counties and all of Arizona. District headquarters will be at 301 W. G St., San Diego.

● Anton M. Mitrovich has become sales representative for Rome Cable Corp. in the Portland area. His previous association was with General Electric Supply Co.

● Helwig Co., Milwaukee, manufacturer of carbon brushes for motors and generators, has appointed R. W. Fletcher, 7 Front St., as its San Francisco representative.

● Lee Rawlings of Rome Cable Corp., Salt Lake City, announced that his new address will be 230 S. 4th West. He recently moved from 461 Union Pacific Annex Bldg.

● Earl S. Condon Co., Los Angeles, is the newly appointed representative in southern California, Arizona and Nevada for Gregory Electric Co., San Diego, manufacturers of electrical power and distribution transformers. The Gregory factory, with key personnel, has recently been moved from Chicago to the southern California location.

● Sylvania Electric Products Inc. announces it will build its first West Coast manufacturing assembly and warehouse plant at Vernon, Calif. The unit will comprise 50,000 sq. ft., to be followed by construction of another plant in San Francisco.

● Thermador Electrical Mfg. Co. has moved its northern California office to Room 201, Pacific Bldg., 610 16th St., Oakland.

● Clarence Pagel is Zenith's new regional manager in San Francisco. The appointment is a part of the firm's newly reorganized field sales set up. The new San Francisco region embraces West Coast states, Arizona, parts of New Mexico and Utah, Idaho and Montana.

DIRECTORY ADDITIONS

DIRECTORY OF MANUFACTURERS

APPLIANCE MFG. CO., Alliance, Ohio—O. B. Wilt Co., San Francisco.
ROEBLING'S SONS CO.—G. C. Bukowsky, San Francisco.

DIRECTORY OF REPRESENTATIVES

PORTLAND: Anton M. Mitrovich
SAN FRANCISCO: O. B. Wilt Co., 1355 Market St.

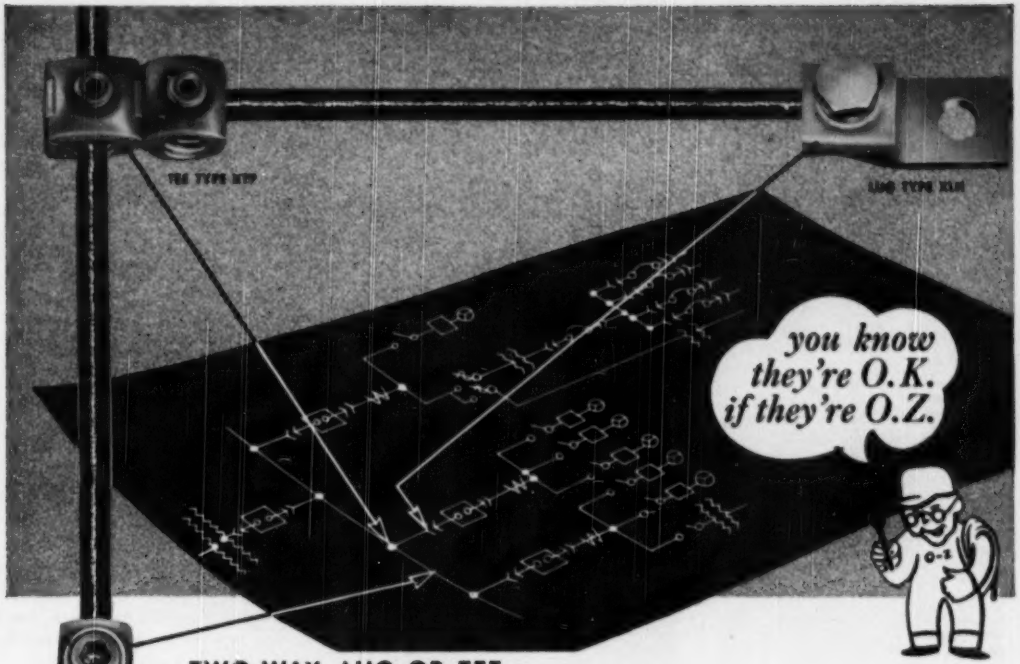
WESTERN REPRESENTATIVES WANTED

If interested please write Electrical West, 68 Post St., San Francisco 4, Calif.

An Eastern manufacturer of fine wet ground Mica sold to the rubber and paint trades is seeking Western representatives.

A manufacturer of electric coils and assemblies, transformers is seeking Western representatives.

Manufacturer of fluorescent starters, duplex receptacles, sign receptacles and contract assemblies for other manufacturers is in need of a Western representative.



TWO-WAY, LUG OR TEE...

GET PERMANENT CONNECTIONS WITH ALL THREE...

TWO-WAY TYPE XW

Whenever you're tapping, butting, terminating, put in **OZ.** solderless connectors—then you're sure of permanent connections . . . *always*. There's a solderless connector in O. Z.'s complete line of thirty different types that will assure you fast, easy installation—as well as positive, strong connections—on any wire in any of the wide range of sizes used in building installations. Here are a few of the features that make O. Z. solderless connectors outstanding:

Tin-plated spring steel lock washers that hold their resiliency, maintain pressure—permanently.

Serrated pressure plates that give maximum bite for positive grip.

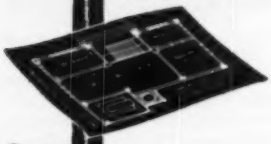
Highly conductive copper alloy body that is acid dipped to assure low resistance contact.

Extra strong copper alloy bolts and hinged parts that guarantee strong contacts, give lasting mechanical strength.

Simplicity of one-piece construction for speed of assembly—no parts to lose.

Ask nothing less than permanency of the connectors you use! Ask your distributor for O. Z. solderless connectors. He can supply an O. Z. connector for every type of application. He also carries a full line of O. Z. Insulated Bushings, End Fittings, and Split Couplings—equally unmatched for performance!

All types of O. Z. solderless connectors are satisfactory for aluminum building wire if ordered with the special Cadux plating.



CONDUIT FITTINGS
SOLDERLESS CONNECTORS
CABLE TERMINATORS
CAST IRON BOXES
POWER CONNECTORS
GROUNDING DEVICES

O.Z. ELECTRICAL MANUFACTURING COMPANY

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PROFILES

Don Mitchell, president, and Garlan Morse, director, Pacific Coast sales of Sylvania Electric Products, at a San Francisco Sylvania luncheon, above left

Charles M. Rowland, above, has been appointed G-E manager of appliance sales at Los Angeles. He comes from Bloomfield, N. J., where he was sales manager of packaged refrigeration

W. H. Mott, left, has been named Butte manager for G-E, replacing C. A. Champ, who retired after 38 years

Caroline E. Horn, center, who heads the photometric department at Electrical Testing Laboratories, New York, addressed two IES sections while visiting the West, describing testing for certification. She is a past chairman of the New York Section, IES. Leonard Hobbs, Smoot-Holman Co., Los Angeles, at left, spoke on certification programs as a guarantee of quality. Sol Cohn, California Electric Supply Co., San Francisco, right, is vice-chairman, Northern California Section and presided at the meeting there. See story on the talks on page 101

High-voltage trouble shooters

When winter storms hurl broken trees across power lines, trained P. G. and E. "trouble shooters" speed into action to restore your electricity. First step is to set up road blocks around the danger zone. Then, armed with "hot line" tools, the crewmen unscramble the high-voltage wires which may still be charged with electricity.

Next they cut out any sections that must be replaced, repair them fast and flash the word to the Dispatcher to begin pouring power back into the lines.

"SOS" is radioed or otherwise rushed to every "trouble man" in the area . . . and the closest are assigned to the mission. If they need extra help, they call for reinforcements.

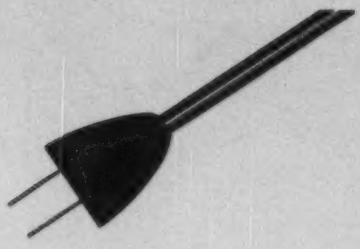
Lights go on again fast because P. G. and E. trouble shooters stand a 24-hour vigil. Their job is to keep power flowing to homes, farms and factories.

Work never stops on our power-building program

P·G·and E·

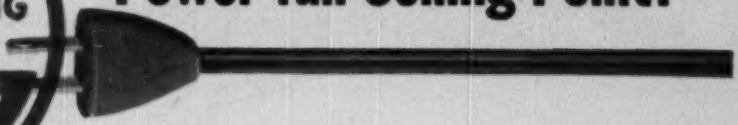
PACIFIC GAS AND ELECTRIC COMPANY

SWZX-350



ADEQUATE WIRING SERVES AND SAVES

Power-full Selling Point!



Adequate wiring in customers' homes gives them the performance they expect from every electrical appliance. It makes them *satisfied* customers — and good prospects for future sales.

So what happens when your customer plugs in an appliance and turns it on is important — it is the *crucial point* which makes or breaks future sales.

Appliance dealers have a vital interest in adequate wiring because it means more business and more profits. Adequately wired homes have enough circuits of the right size and enough outlets and switches—in short, enough power to guarantee top performance of all appliances.

Adequate wiring is your best selling point. It puts power into all the others!

Pacific Coast Electrical Association

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